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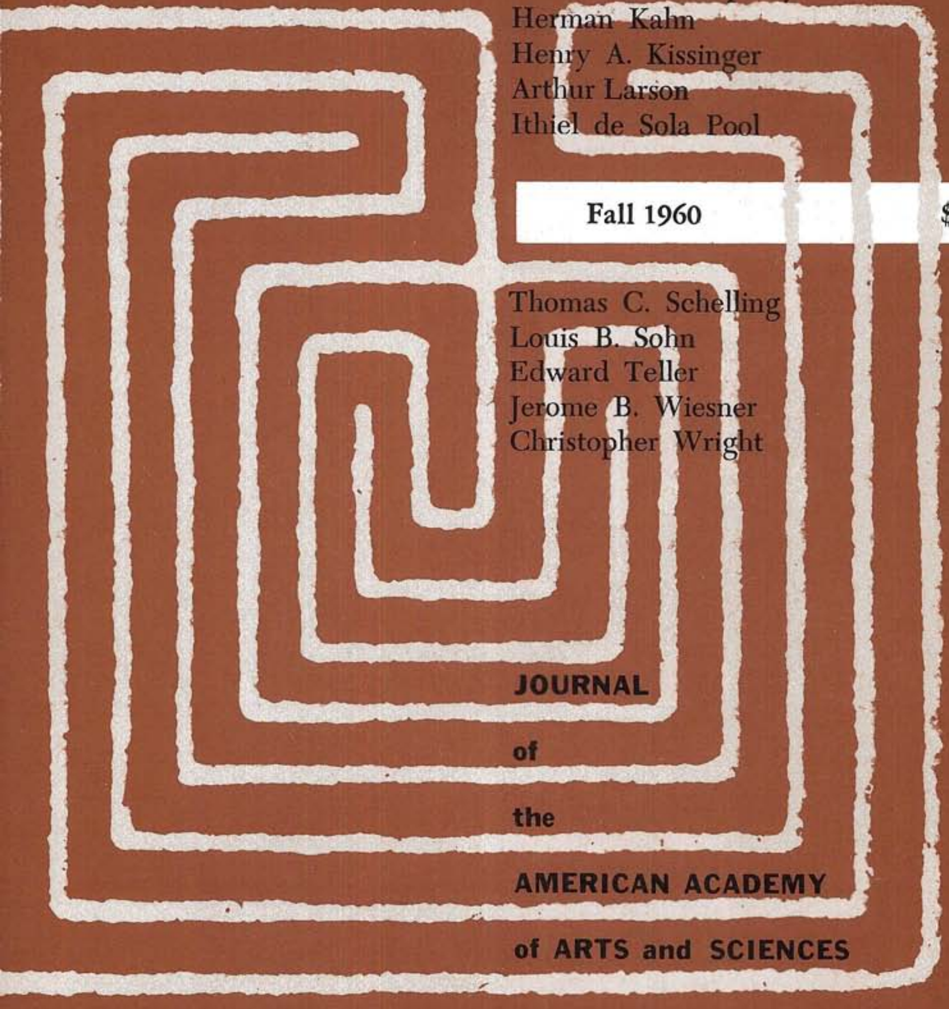

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Editor's Prefatory Note

UNTIL TWO GENERATIONS AGO, war was widely regarded as a biological and sociological inevitability—even a necessity. To most theorists and statesmen, war was not the desperate last resort for settling conflicts; rather it was the mechanism that prevented society from slipping into "degeneration" and that served as a supreme arbiter for testing the virtue and worth of that society. Just fifty years ago William James wrote, "History is a bath of blood," but war is "the gory nurse that trains society to cohesiveness" and provides the "moral spur" to develop the essential, manly virtues of "intrepidity, contempt of softness, surrender of private interest, obedience to command . . . the rocks upon which states are built."

James's proposal to search for an alternative way of attaining these goals—for a moral equivalent of war—was motivated by a precise intuition of the frightening future, the future that has indeed become our own present.*

> When whole nations are the armies, and the science of destruction vies in intellectual refinement with the sciences of production, I see that war becomes absurd and impossible from its own monstrosity. Extravagant ambitions will have to be replaced by reasonable claims, and nations must make common cause against them.

Today these two sentences reflect what every thoughtful person believes. Never before in history have the opposing commanders themselves openly professed their general revulsion from war. Two world-wide conflicts and the threat of ever more nightmarish weapons have propelled us with a most unhistoric speed to a historic discontinuity. As James prophesied, we must regard war no longer as an inherent necessity of the social process but rather as an absurd monstrosity.

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* William James, "The Moral Equivalent of War," published in 1910 and reprinted in *Essays on Faith and Morals* (New York: Longmans, Green and Company, 1943), pp. 322-323.

Yet even this new attitude would give us little hope, for in itself the absurd well may happen. Our only hope comes from a further development James did not foresee: while the art and science of war have become enormously refined, the art and science of controlling war have for the first time shown signs of genuine promise. Our special issue of *Dædalus* is entirely devoted to the full exploration of this promise. Details concerning the context and setting of the issue are given in the two papers that follow.

As recently as a year ago a coordinated group of papers of this range and quality could not have been assembled. Although for over a decade studies and negotiations in the field of modern arms control have been in progress, it was only late in 1959 that I found a sufficient increase in the quality as well as the amount of professional, public discussion on this life-and-death issue. To draw an appropriate analogy borrowed from nuclear engineering, it was as if the whole field of study had at last passed "beyond critical." This change both in atmosphere and in substantive work made it possible to assemble what may be regarded as a handbook on the problems of arms control and national policy.

The three general objectives of this collection, as stated to the authors in the commissioning letters, were to present the potentially feasible routes as well as the obstacles to arms control as one of the means toward eliminating nuclear warfare and improving national security; to explore the complexity and the magnitude of the task; and to illustrate some of the major considerations bearing on decisions of national policy.

While there is much common ground among the essays, the diversity of outlook and thinking on the subject that does in fact exist will be evident. These differences would undoubtedly have been sharper if the authors had not been chosen to represent specifically the points of view of contributors in the United States. There are several reasons for this nationally oriented approach, not the least being that a necessary condition of any significant arms-control treaty is that it be acceptable to our own policy advisers and to the United States Senate. This simple necessity accounts for much of the content and emphasis in this issue. However, comments upon these essays on the part of foreign observers are being obtained and will be printed in the Department "Opinions and Issues" in the next issue of *Dædalus*.

Acknowledgments. For this special issue I formed a Guest Editorial Board, with Jerome B. Wiesner, Director of the Research Laboratory of Electronics at the Massachusetts Institute of Technology and member of

the President's Science Advisory Committee as Chairman, and the following as members: Robert R. Bowie, Director of the Center for International Affairs, Harvard University; Donald G. Brennan, Research Mathematician, Lincoln Laboratory, and Research Associate, Department of Mathematics, Massachusetts Institute of Technology; John T. Edsall, Professor of Biology at Harvard and Chairman of the Committee on the Technical Problems of Arms Limitation of the American Academy of Arts and Sciences; Bernard T. Feld, Professor of Physics, Massachusetts Institute of Technology, and Chairman of the Operating Committee on the Technical Problems of Arms Limitation of the Academy; William T. R. Fox, Director of the Institute of War and Peace Studies, Columbia University; Stephen R. Graubard, Assistant Professor of History at Harvard and Managing Editor of *Dædalus*; Henry A. Kissinger, Associate Director of the Center for International Affairs at Harvard and Director of the Harvard Defense Studies Program; Louis B. Sohn, Professor of International Law, Harvard; and the undersigned. Dr. Brennan agreed to act as Guest Editor, and, in consultation with the Board and the Editorial Office, drew up the prospective Table of Contents of the issue.

It is indicative of the high priority one must place on the questions here discussed that virtually every authority we approached accepted despite the relatively short time we could make available to them. On the 20th and 21st of May 1960 most of them joined with some forty other professionally interested persons in a closed conference on the problems of arms control at the House of the Academy, to discuss the drafts of the papers, which had previously been circulated. The conference resulted in a lively exchange of opinion among the participants which has continued through the mails and has caused a substantial reworking of several of the original drafts. Dr. Brennan's devoted and skillful contribution to the editorial work is evident throughout the issue.

In view of the considerable work load that had to be shared, it is appropriate to record, both on Dr. Brennan's behalf and my own, the special help received from the following, who were consultants or participants of the conference: Bernhard G. Bechhoefer, Lewis C. Bohn, Lawrence S. Finkelstein, Betty Goetz, Arthur T. Hadley, Louis Henkin, Spurgeon M. Keeny, Jr., Charles L. Mack, Jr., R. I. Spiers, and John W. Tukey.

Among other participants of the conference whose comments were valuable in the final formulation are the following: Harold Brown, Herbert S. Dinerstein, David C. Elliot, W. A. Higinbotham, Fred C. Iklé, Harold Kuhn, Ernest W. Lefever, Colonel Richard Leghorn, R. Duncan Luce, Kirtley F. Mather, J. Alden Nichols, Paul H. Nitze, Colonel Kent Parrot, John B. Phelps, Howard Raiffa, David Riesman, Henry Rowen, Matthew Sands, Herbert Scoville, Jr., J. David Singer, Harry Starr, Lester Van Atta, and Albert Wohlstetter.

A special word must be said of the great debt of gratitude we owe to the Johnson Foundation of Racine, Wisconsin, whose financial support has made this whole enterprise possible. Without the quick and generous decision on the part of the Foundation, in particular that of its President, Leslie Paffrath, we might well have failed in seizing the chance to assemble a conference and an issue of this scope.

GERALD HOLTON

JEROME B. WIESNER

Foreword to the Issue "Arms Control"

THIS ISSUE of *Dædalus* devoted to the problems of arms limitation attempts to provide some of the basic information and understanding needed for an intelligent public discussion of the disarmament problem. To a distressing degree American citizens, who normally insist on free and open discussion of important issues facing their country, have turned away from the problems of arms control as being of such complexity and requiring access to so much secret military and political information as (supposedly) to be beyond the comprehension of the ordinary citizen. But, without a widespread understanding of the options available to the nation and without some ability on the part of the general public to judge the relative security of various alternatives, it will not be possible for the United States to find acceptable arms-limitation agreements or to accept the constraints such agreements will impose on the military activities of the country.

During the past two years discussion groups and seminars on problems of arms limitation were held in the Boston area. These groups found themselves badly handicapped by the lack of published material relating to their studies. When the publication of this issue was proposed to them, they were quick to encourage it and collaborate on it.

One cannot deny that the political, military, and technical issues involved are complex. Moreover, even in the classified literature there is little on the substantive problems of arms limitation. The lack of popular or technical literature in this field indicates that until now there has actually been little intellectual effort expended on it, a disturbing fact that is pointed out by several of our contributors.

Secrecy, it may be noted, has not greatly inhibited the appearance of *military* information. Technical and military journals, leaks to the syndicated daily columns, and even the *Congressional Record* provide a voluminous flow of technical and tactical information regarding military weapons and the official assessment of the politico-military situation. This flow of information, much of it officially regarded as secret, is in fact impossible to stem. It is the lack of anything to publish, not secrecy restrictions, that accounts for the absence of a body of literature on arms control.

The primary motive, therefore, in preparing this collection of essays was to stimulate public discussion of the arms-limitation issue by providing the views of a number of persons who have given some thought to the problem, and, if possible, to make a contribution to the serious literature in the field. Nearly all the contributors have had an intimate association with the military or political aspects of the United States Government during the past decade and so can write with considerable understanding on the complicated issues involved.

One idea stands out very clearly in these papers: the general consensus that civilzation is faced with an unprecedented crisis. There is a growing realization among knowledgeable people that if the arms race is allowed to continue its accelerating pace, our country will have less security, not more, with each passing year. As a result, there is an ever increasing likelihood of a war so disastrous that civilization, if not man himself, will be eradicated.

My own experience is not very different from that of many others who have worked hard during the past decade and a half in an effort to provide the country with a strong military defense. We have seen each of our advances matched by Soviet developments, so that, as time passed, the only discernible result has been that both our nations have produced more and more destructive weapons against which there is no defense.

One of the most ironic aspects of the situation in which the United States and the Soviet Union find themselves is that each is running an arms race with itself. Because of the technical capabilities of both countries, neither will for long lag behind the other in developing any new weapon. As a consequence, we are forced to work harder and harder in the effort to maintain a given degree of security. Thus we create twin spirals of invention and production, which, because of the nature of the weapons involved, appear to lessen, rather than enhance, the possibility of that security.

While the Doomsday Machines discussed in Herman Kahn's essay may appear somewhat far-fetched, it is an unpleasant fact that almost any invention the weapons engineers can conceive of can now be built—and the logic of the arms race seems to require that any possible weapon *be* built, no matter how horrible. Furthermore, both the Soviet Union and the United States already own enough nuclear explosives, and are fast getting the delivery capability, to kill each other several times over. The prospect of the spread of large numbers of such weapons to other nations only adds to the nightmare.

Obviously, the most important task confronting us today is to find the means of halting the arms race and eliminating the danger of nuclear war. This does not appear to be something that can be safely done by unilateral actions on the part of the Western allies, and it is doubtful whether the Soviet leaders would regard unilateral disarmament as a course on which they could embark with safety. Like it or not, the nations of the world must make a superhuman effort, working together, to reach agreements leading to some form of rational system of world security.

Yet most people do not quite believe in disarmament. In fact, some people view with suspicion any attempt to impose restrictions on military activities, and many more are skeptical of the possibility of actually achieving a meaningful agreement on arms control. Such cynicism is strongly supported by historical precedents. On the other hand, history also indicates that until now wars have occurred with distressing regularity, and that in recent times each successive major war has been larger and more destructive than the previous one. There is every historical reason to conclude that if we drift along as we are now doing, another major war will certainly occur. We can only avoid that disaster if the nations of the world regard war itself as a common enemy and make a truly consummate effort to work together in resolving the important issues that are involved.

Unfortunately, nations, like most individuals, become interested in adequate fire protection only after the house has burned down. At the moment, there is little official willingness anywhere to undertake the effort required to make a success of arms control. Shall we wait until after the next world war, in which hundreds of millions of people will undoubtedly be killed, uncountable future generations condemned to genetic death or malformation, and thousands of billions of dollars worth of property destroyed—before it becomes obvious to the survivors that war should be outlawed? In retrospect, it will be impossible to understand why the consequences of the arms race were not crystal clear beforehand, and why an otherwise rational people like the citizens of the United States did not insist that their leaders make a reasonable effort to find alternatives.

I feel a word of caution to the reader is needed. Partly owing to the small amount of sound research in this field in the past, there are many real gaps in our understanding of the military, technical, and political problems involved. Many of the authors, myself included, stress the need for intensive study. I should like to warn against the expectation that any amount of advanced planning and study, no matter how thorough, will see the problem completely solved. But a start must be made. First, and second, and continuing studies must be initiated. Research and development on a large scale are necessary. And the nations must be willing to try out the results of these carefully thought-out studies without insisting on a blueprint to completion. We must accept an understanding of the desirable objectives and of the multitude of technical details involved, so as to gain the confidence to set off on the road to peace.

I believe we already have a sufficient understanding of the problem of arms control to make an effective start, and I am confident that if the nations of the world were to devote one quarter of the effort in terms of manpower and money now being expended in the arms race on the quest for a lasting peace and a better world, the goal, though a difficult one, could be achieved in our lifetime.

D. G. BRENNAN

Setting and Goals of Arms Control

Introduction

THIS PAPER has two main objectives. The first is to establish the military and strategic setting in which arms control must operate. This section includes a brief review of contemporary military doctrine, principally (but not entirely) for the purpose of introducing the relevant concepts and terminology to readers who are not experts on these matters. The second major objective is to enumerate some of the major goals of arms controls. A third objective, subordinate to the first two, is to provide at least some coverage on topics of major pertinence to arms control that are not sufficiently treated elsewhere in this issue of *Dædalus.*

It should be mentioned that this paper is not a survey of the topics treated elsewhere in the volume, nor is it intended as a synthesis of all the elements central to arms control. It is also not meant to provide a discussion and an emphasis representing a consensus among the other authors. Although most of the authors would probably agree with most of what I shall say, it has not been written with this objective in view, and the agreement would not in any event be complete.

The Goals of Armament Policy. It is desirable at the outset to review some fundamental facts. Most of us do not regard either war or the means of war as ends in themselves. We regard military force as means to other, nonmilitary goals. This simply means that there is a consensus among a large number of people that military action is not one of the ends of life.

What, then, are the goals that armament is intended to serve? The first answer to this question is seemingly easy: it is simply survival—national survival at the level of the nation, personal survival at the level of the individual. But it is possible to distinguish different kinds of survival—physical survival, political survival, survival of a standard of living.* The significance of such distinctions is that different armament policies would support some kinds of survival without necessarily supporting others. For example, some people believe that a policy of complete unilateral disarmament and non-resistance would possibly support sheer physical survival. Even if true, this policy would surely be unlikely to support political survival, and still less likely to support the survival of our standard of living. (I am here speaking of the possibility of another nation making large demands on our economic output or other resources, and not about the problem of internal adjustments to disarmament.) On the other hand, modern weapons are so impressive that a strong "Fortress America" armament policy would probably support national survival in all three senses, but might fail to support other national goals and purposes.

The simple problem of national survival, in its various senses, is sufficient to indicate the character of the enormously complex interaction among armament policy, armament-in-being, and national goals and purposes. Of course, the present and projected armament and national goals of other nations—or, rather, our beliefs concerning them—are components of this interaction. To affirm that armament should be only a servant of national purposes is not to say that there is a simple cause-and-effect relation between them; the interaction is much more complex. Radical technological developments sometimes influence armament policy more profoundly than do explicit decisions of national policy.

The visible complexity of this interaction increases in both degree and kind when national goals beyond mere survival are considered. The increase in degree is fairly obvious; it stems from the increased complexity of the added armament required—overseas bases, logistics, different weapons—and the broadened spectrum of goals. Most of the added goals are in the realm of foreign policy, and relate to such matters as the maintenance of independent nations in Western Europe and South America. The increase in the kind of complexity is less obvious; it stems from the fact that the fundamental ends the foreign policy itself is intended to support are less clearly defined than the simple ends of physical and political survival.

A reasonable view of the objectives of foreign policy is that it is intended to secure a world order with a structure that is compatible with the fundamental purposes of the United States. This view has recently been set forth with considerable clarity and detail in a broad study[1] of the interaction under consideration here. But this view immediately raises the question: what are the fundamental purposes of the United States?

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* Henry Kissinger has suggested adding "moral survival" to this list. This is a very important point, and I should do so but for the fact that it would complicate the following discussion. Indeed it is worth stressing that certain passages depend strongly on *not* including moral survival in this list.

Several critics have maintained that we do not, in fact, *have* an adequate sense of national purpose, and that this problem infects the formulation of foreign policy and, consequently, the formulation of politico-military strategies to support such policy. On the other hand, there are many who have more or less explicit ideas about the fundamental ends of what has been called "the affluent society." But it is not my present purpose to enter this debate *per se*. It is sufficient here to point out that there *is* a debate—which, perhaps, may be intrinsic to a pluralistic society. While we have a consensus that military action is not among the ends of life, and that survival *is* among the ends of life, we have no similarly complete consensus concerning the basic national purposes (beyond survival) of the United States.

At bottom, therefore, armament policy is one of many aspects of the general problem of achieving a world to our liking; but we seem to lack a clear collective sense of just what that world should or could be like in the long term.

All this is not to say, however, that there are not eminently sensible *intermediate goals* that have constituted the *immediate objectives* of our foreign policy of the recent past—goals on which, moreover, there is general agreement. We do not think it desirable that the political future of the South Koreans should be determined by the armed forces of North Korea and the People's Republic of China, nor do we wish to encourage the idea that such aggression can pass unnoticed, possibly to be repeated elsewhere; we do not wish to see the farmers of Japan collectivized in communes; and we have made promises to the people of West Berlin that should be kept.

The most significant aspect of our foreign policy of the present and the recent past is perhaps best characterized as a holding operation. This is the main virtue of the doctrine of containment; whether or not we have good collective ideas of what we are ultimately holding *for*, we certainly have good ideas of what we are holding *against*. This agreement, while minimal, is important. The aggression in Korea is too fresh in our minds, and the possible loss of Western Europe to other Communist aggression seems too great a potential catastrophe to permit us to contemplate the philosophical basis of our foreign policy while the world around us burns. At least, to the extent that it does not directly conflict with national survival, and possibly to the extent of considerable risk that it may eventually do so, most of us feel obliged to support and defend the non-Communist world in general and our allies in particular. This obligation has heavily dominated our armament policy of the last decade.

National Security

The Notion of Security. The phrase "national security" is one that receives much use but little analysis. Various views of security are possible, and a brief indication of the range of possibilities is useful.

To begin at the level of individuals, there are some people who on moral or religious grounds oppose violence so strongly that no ends whatever, not even the preservation of life itself, are sufficient to justify such violence. The avoidance of violence being a primary end, security for this goal would reside in complete unilateral disarmament and nonresistance.

The most basic view of national security commonly held is the protection of national survival, in all three senses discussed above. This is usually the minimal demand on "national security." Beyond this, the concept quite generally extends to the military and politico-military support of national goals in general and foreign-policy objectives in particular. Improvement of relative military capabilities to support such goals may be obtained at the expense, sooner or later, of impaired national security with respect to national survival. This can and does happen because of economic or political limitations on the armament that can be bought; because of the armament obtained in response by hostile powers; because of a basically defective strategy or armament policy; or because of any combination of these factors. In spite of this conflict, the common consensus of national security is that it relates to the protection of national survival and the support of foreign-policy goals, in some mixture of the two. The character of the mixture and the extent of the interaction and conflict between the two objectives is at best dimly understood, and sometimes not perceived at all.* However, it is probably the view that would be set forth by the majority of informed students of these matters, and it is certainly the concept underlying the remainder of this paper.

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* That is, it is sometimes held intuitively that support of foreign-policy goals is equivalent to support of national survival. As suggested above in the remark about a "Fortress America" policy, it takes very little thought about the potency of modern weapons to dispel this notion, whatever validity it had before 1945. This is not to say that there is not some interaction, but it is quite short of "equivalence."

Current Views and Concepts. The evolution of ideas on the contemporary state of national security, including those on current military doctrine, strategic thinking, and armament policy, is a subject on which there is very extensive literature. To mention only a few of the more substantial studies in addition to the one already mentioned,[1] there are earlier books by Kaufmann[2] and Kissinger[3] and more recent volumes by Brodie,[4] Knorr,[5] Morgenstern,[6] and Schelling,[7] among others. An especially fine brief survey has recently been given by Rowen,[8] and books by Kahn,[9] Kissinger,[10] Singer,[11] Wohlstetter,[12] and Phelps[13] are anticipated in the near future. Studies of Soviet strategic views have been published by Garthoff[14] and by Dinerstein.[15] It is not possible here to include a detailed study of this area, but I shall attempt a very cursory survey and critique of contemporary Western ideas in this section.

The central concept in current strategic doctrine is that of deterrence. As a phenomenon, deterrence is as old as man—perhaps much older. As examples of deterrence, the protective equipment of a skunk serves to deter *some* enemies from troubling him. The existence of the Roman legions served to deter *some* attacks by invaders. A policeman walking a beat serves to deter *some* crime. The United Nations Emergency Force in Palestine is supposed to deter the resumption of active war between Israel and the Arab powers. The missiles, bombers and nuclear weapons of the United States Strategic Air Command (SAC) are supposed to deter a nuclear attack on the United States.

The essence of a deterrent is a threat to carry out some punitive measure in the event that the action against which the threat is aimed does transpire. Deterrence is therefore a basically defensive phenomenon, and, as such, has always been present in military strategy to the extent that the strategy was defensively oriented. However, as the first three examples above illustrate, and as the fourth tends to suggest, deterrence can fail. The consequence of a failure of military deterrence is at least the increased likelihood of military action, and perhaps war itself, unless the deterrent threat involved proves to be an empty bluff. In the past, a failure of military deterrence has undoubtedly been painful for the participants involved, but not intolerably painful for Western society as a whole; in particular, it has not been catastrophic for the United States. The deterrent aspect of defensive military forces was formerly taken for granted.

But, today, the doctrine of deterrence has assumed paramount and explicit importance in contemporary strategic thinking. The consequence of a failure of strategic nuclear deterrence could be a general nuclear war and a resultant catastrophe for Western society of a magnitude unparalleled in the whole of human history. This possibility has focused attention on the problem of keeping a nuclear war from happening—that is, of deterring it.

The idea of deterrence has become a central organizing concept for all types of strategic problems and for all manner of enforcement threats—for example, the use of conventional limited-war forces to deter aggression by other conventional forces, and the deterrence of evasion under an arms-control agreement. In the process, we have learned a good deal about deterrence. To quote a brief summary by Schelling:[16]

> We have learned that a threat has to be credible, that credibility may depend [inversely] on the pains of fulfillment for the one who makes the threat, and that to make it credible one has to get "committed" to its fulfillment. We have recognized that a readiness to fight a limited war may detract from a threat of massive retaliation; that a threat may be more credible if the means of retaliation are in the hands of those whose resolution is strongest (as in recent suggestions for "nuclear sharing"); that the rationality of the adversary is pertinent, and that madmen, like small children, often cannot be controlled by threats; that the success of the threat may depend (in the analogy of the trapped lion) on whether the threatened party is left some tolerable recourse; that a threat of all-out retaliation gives the enemy every incentive, in the event he should choose not to heed the threat, to initiate his transgression with an all-out strike at us; and that the threat of massive destruction may deter an enemy only if there is some assurance of nondestruction in the event he complies, so that too great a capacity to strike him by surprise may induce him to strike first.

This passage is primarily oriented toward nuclear deterrence, but the basic principles are applicable to other types.*

Other than deterrence, the main strategic and military concepts requiring mention here are general war and limited war. The distinction presents semantic difficulties. General war is universally understood to mean a nuclear war involving the major nuclear powers, one in which the homelands of these major powers are subject to nuclear attack. The detailed conduct and the consequences of a general war are subject to an enormous range of possible variations,[9] which, however, will not be explored here. "All-out" war is the extreme case of a general war. Broadly speaking, limited war is usually taken to mean a war that involves major powers but one that is not a general war in the above sense. However, it is very important to distinguish between a limited nuclear war and a limited high-explosive (HE) war—a distinction not always as sharply maintained as it should be. A few writers occasionally insist that a limited war is impossible, but this assertion is untenable; the Korean War was limited in numerous ways, gas was not used in World War II, and pre-1939 history is filled with examples of conflicts that were limited in important ways—in objectives, in the resources employed, and the manner of employment.* Mention should be made of the considerable illumination provided by Schelling[17,18] on the kinds of qualitative and legalistic distinctions that may serve as "limits," and on the tacit methods of communicating such limits.

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* Some writers use the term "deterrence" to mean only "nuclear deterrence," most often of the "massive retaliation" kind. This is an abuse of language and is to be regretted on several counts.

It is useful to analyze some of the strategic requirements a national security policy must meet in terms of the different kinds of deterrent functions that must be provided. Many different breakdowns are possible; a widely known classification introduced by Herman Kahn[9,19] is as follows.

Type I: Deterrence of direct nuclear attack on the United States.

Type II: Deterrence of extreme provocations. These include major attacks on United States forces, on our NATO and SEATO allies, and on other important areas of the non-Communist world.

Type III: Deterrence of moderate provocations. These range from the shelling of Quemoy and cutting submarine cables, through shutting off access to Berlin, up to aggressions on the scale of Korea.

This classification is helpful because it serves to isolate the different functions that must be provided and to separate them from the various types of capabilities that might be employed to implement the functions. The functions must always be provided in some degree for the indefinite future; the capabilities employed depend enormously on complex estimates of the world situation in general, and on hostile intentions and forces in particular. (For example, there is a rather abstract Type I requirement to deter a direct attack by Canada, but no specific capabilities whatever are required to implement this function.) Even for a fixed situation, estimates of the capabilities required differ widely, as in the current debate over the presumed "missile gap." A more extreme example of differing estimates resides in a comparison of current "official" views with the position advanced by the advocates of unilateral disarmament, most of whom would not question the desirability of providing the functions by some sort of means. In addition, the situation can change with the passage of time and with the changing intentions and capabilities of other nations. It might be appropriate to introduce here the idea (to be elaborated below) that arms-control measures are oriented toward improving the performance of the functions by adjusting mutual capabilities.

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* As this suggests, the definitions of general war and limited war as given above are defective, principally by reason of their brevity. A really sharp distinction (other than a geographic one) between limited nuclear war and general war does not exist, given the possibility of any sort of "limits" or restraints in the conduct of a general war.

In a general context such as the present discussion, however, the specific breakdown given above can be improved by distinguishing between extreme *nuclear* provocations and extreme *nonnuclear* provocations. The lack of this distinction (a lack probably traceable to people who place primary reliance on "massive retaliation") can be rectified by a breakdown of deterrent functions such as the following.

Type A: Deterrence of direct nuclear attack.
Type B: Deterrence of extreme nuclear provocations.
Type C: Deterrence of extreme nonnuclear provocations.
Type D: Deterrence of moderate provocations.

The distinctions between these four are worth brief comment. It has occasionally been held that each of Types A, B, and C deterrence could be adequately implemented with a single type of threat capability, namely, the capability of delivering a major nuclear strike on the homeland of the aggressor. The use of this threat to implement Type C deterrence could be, and was, questioned trenchantly on moral grounds alone (among others), even in the days when we had an essential monopoly of nuclear weapons. To any reasonable person, the growth of Soviet nuclear capabilities has since placed this policy nearly or entirely beyond the realm of credibility, on several counts. To name only three: first, a Soviet retaliatory strike on the United States could be extremely painful—with perhaps 10 to 70 million people dead, with grave hazards to the health, to political survival, and to the standard of living of the survivors. Second, there is only slight likelihood that our strategic nuclear response to a failure of Type C deterrence would in fact secure the protection of the original object of the provocation. Third, and perhaps most important, there could be an alternative response that could be at once much less painful and much more successful: the use of conventional (HE) forces. We could, if necessary, mobilize and equip a 15-million-man army that would probably be able to defeat the aggressive conventional forces of any nation in the world, not excepting China, which could mobilize the men, but could not adequately equip, train, or transport them. An army of this size need not be in existence on the first day of the provocation, and probably would never need to be that large.*

For such reasons, there should no longer be any serious intention of responding to a failure of Type C deterrence with a major nuclear strike. For example, Secretary of State Christian Herter said in the United States Senate on the occasion of the hearings on his nomination: "I *cannot conceive* of any President involving us in an all-out nuclear war unless the facts showed clearly we are in danger of all-out devastation ourselves." (As quoted by Herman Kahn;[19] emphasis supplied by the present author.) Apart from a few people who would probably be quick to change their minds about the issue in a crisis, the policy of responding to a conventional-force attack with a strategic nuclear strike seems to be an essentially dead issue.

An issue that is much less dead, but may be rapidly dying, is the use of a response intermediate between conventional forces and a strategic nuclear strike, namely, tactical nuclear weapons and limited nuclear war. Close analysis of limited nuclear war appears to indicate that it would be militarily disadvantageous if used by both sides, at least, in most cases where it might be employed. In addition, it would be highly dangerous and would be likely to produce undesirable political effects, such as hastening the spread of nuclear weapons to other countries. Some of the difficulties of this response are indicated in the essay below by Kissinger.

It should be noted, however, that in the absence of a comprehensive arms-control program, an extremely good general-war capability might be required in the event of a failure of Type C deterrence, simply to persuade the enemy that it is unmistakably in his interest to refrain from transgressing the HE-nuclear boundary when the subsequent HE war begins to go badly for him. This last might be called "escalation deterrence" — preventing the scale of initially limited conflicts from growing to disastrous proportions.*

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* There is an important and unresolved question as to just how large the army should be on the first day of the conflict. It obviously depends somewhat on the HE forces-in-being of other nations, among other things. As noted in the essay below by Kissinger, the need for good conventional forces-in-being is greater than at any time in the past, but the potential role of mobilization and industrial capacity for Type C and Type D deterrence has been overly neglected in recent years.

The kinds of capabilities currently being procured (or discussed for possible procurement) to implement the various types of deterrence are too well known in outline to require more than the briefest mention here. They include a wide variety of nuclear weapons (together with the requisite aircraft and missile delivery systems), active and passive defense systems, and conventional-war forces.

There is a very general consensus among military experts that our current conventional forces are unnecessarily inadequate. There is, however, a complicated trade-off (which is hardly ever recognized explicitly and is not at all well understood) between large HE forces-in-being and consequently limited initial gains achieved by an aggressor on the one hand, and limited HE forces-in-being and (possibly) the consequent necessity of large mobilization to retake lost ground, on the other. To some extent this is a trade-off between present national resolve and future national resolve. Some commentators seem to discount our future national resolve excessively, as did the Japanese in 1941.

There is much less of a consensus as to the adequacy of our present and projected nuclear deterrent forces. There is an increasing recognition of the fact that the simple form of the "balance-of-terror" theory to implement Type A deterrence is inadequate, and that the balance, as was aptly noted by Wohlstetter,[20] is "delicate." This stems from the fact that contemporary nuclear-weapon systems provide an enormous potential advantage to an aggressor, who, in launching a Pearl-Harbor style of surprise attack on his victim's retaliatory forces, might reduce the possible level of retaliation below that which would deter the attack. In consequence, there is much current emphasis on protecting such deterrent forces (often referred to as "hardening," a term stemming from the protection of "soft" objects against blast overpressure) by mobility, by concealment (as in POLARIS submarines), and by sheer concrete, so that much of the deterrent force could survive a surprise initial strike.[20] This type is sometimes called a "second-strike" capability, to distinguish it from a "first-strike" force†—i.e., one which would be highly vulnerable to destruction if struck in a surprise attack. Another distinction often made is between "counter-city" (or "counter-population") capabilities.

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* There may be, of course, a limit as to how badly it might go; "unconditional surrender" is a dangerous objective in an HE war between the major powers if one wishes to keep it an HE war.

† I am using "first-strike force" in a more restricted sense than that conveyed by the term "credible first-strike capability," which implies the ability to limit retaliatory damage to a level at which the initiation of a first strike would be credible, not merely possible. See Kahn.[9,19]

It has sometimes been held that Type B deterrence can be implemented with a vulnerable "first-strike" force; as of 1960, however, so much of our own strategic nuclear capability (such as aircraft carriers with the Sixth and Seventh Fleets) is inextricably involved with NATO and SEATO forces that a failure of Type B deterrence without simultaneous failurs of Type A deterrence is most unlikely.* Partly for this reason, and partly because it does not seem likely that a general nuclear war would consist simply of an all-out attack salvo followed by an all-out retaliatory salvo, such distinctions are becoming somewhat blurred. The detailed facts concerning the composition and functioning of strategic nuclear deterrent forces are highly technical, and for the most part are set forth in literature that is either classified or otherwise unavailable; however, unclassified illustrative computations and considerations have been given by Phelps and his colleagues at Ohio State, among others. [21, 22, 23, 24]

The Role of Arms Control. As the foregoing survey might suggest, that part of our national security that is measured by our ability to guarantee national survival in all its various senses has undergone a precipitous decline in recent years. At the close of World War II, no nation had the capability of inflicting any damage worthy of the name on the United States. At the present time, the Soviet Union could mount an attack that would kill tens of millions of citizens and leave the standard of living of the survivors very seriously depressed. Every projection based on this trend points to an increasingly serious capability; by the late 1960's, the USSR might be able to launch a strike that would extinguish 90 percent of our populace.

This is sometimes taken to mean that the national security of the Soviet Union, relative to ours, has been improving. Perhaps it has, perhaps not; it depends on what is understood by the term and on when the comparisons are made. In the mid-1950's, for example, we had a very nearly one-sided capability to obliterate the Soviet Union, so that their relative position has improved since then—*they* can now threaten "massive retaliation" to deter provocations. On the other hand, our capability of this type was all but negligible in 1946, so that their relative security has not improved from 1946 to 1960.

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* The statement of Herter's quoted above is therefore not particularly relevant to our response to failure of Type B deterrence, except in so far as it explicitly indicates that we might pre-empt under such conditions. This again indicates why it is vital to distinguish between B and C deterrence; indeed, it is probably much less vital (but still vital) to distinguish between A and B deterrence.

But talk of relative security is somewhat beside the point, in any event. The central fact is that the absolute national security (measured in the same sense of their ability to guarantee national survival) of the Soviet Union has also undergone a precipitous decline since 1946. The Soviets cannot be sure that our forces will never be used, whether because of accident, misunderstanding, or our response to a crisis. Neither can we be sure that the Soviet capability will never be used. It is possible to feel moderately relaxed about these facts at the present time, but anyone who feels completely relaxed about them either does not understand the situation or is not acting in a manner that is rational with respect to the goals of society.

For it would seem that each side is likely to be able to inflict more damage on the other in a general war than either would find at all justified by the original objectives of the conflict, whichever side suffered the greater absolute damage. And the possibility of a general war occurring is a real one. The chance of a general war within the next year is not zero, and, assuming the present course of events continues, the likelihood of a general war within the next ten or fifteen years appears very disturbing. Again, assuming the present course of events continues, the possibility of a general war involving China as a participant in the era of 1975 and beyond must appear a very disturbing one indeed—both to the Soviet Union and to the United States.*

It appears, therefore, that the armament policy pursued by the two major nuclear powers for the past fifteen years has brought us both to a situation we should like to see modified. There is no need in the present context to attempt to assign the responsibility for this situation. The question at issue is whether we and the Soviets and others can find means of improving our security by modifying our armament policies, perhaps cooperatively. There seem to be large common interests.

This brings us to a definition of "arms control." It is neither necessary nor desirable to formulate a precise definition that would include everything thought of as "arms control," "arms limitation," or "disarmament," and would exclude everything else. However, it is useful to think generally of arms control as a cooperative or multilateral approach to armament policy—where "armament policy" includes not only the amount and kind of weapons and forces in being, but also the development, deployment and utilization of such forces, whether in periods of relaxation, in periods of tension, or in periods of shooting wars. The approach should be thought of as oriented toward improving the national security of each of the nations involved by adjusting at least some armament capabilities and uses to those "actually" desirable in the light of the intentions, actions, and adjusted capabilities of the other nations.

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* It may be worth pointing out that it has been estimated[8] that by 1975 China will have an industrial capacity equivalent to that of the Soviet Union in 1960.

It is necessary to put "actually" within quotation marks because a sharply defined consensus of what is "actually" desirable is in no way to be expected in any circumstances in even the remotely foreseeable future. In the first place, we are dealing with a very nebulous concept labeled "national security," which has an inherent conflict between the support of national survival and the support of other national goals. In the second place, the "intentions" are also nebulous, not so much in concept as in fact; we ourselves do not know how we might respond to certain crises or provocations, and the Soviets do not know in detail just what actions they would take in support of their national goals. Last, even if precise statements about security and intentions were both possible to formulate and were also known, the interaction of such statements with specific armament policies is so enormously complex as to be utterly beyond a detailed and precise understanding. But these problems of understanding and analysis are with us already, even with a largely unilateral armament policy. They do not necessarily make the problem of improving the world by arms-control measures impossible of solution.

Some further clarification of the concept of arms control may be useful. To begin with, it includes the possibility of an actual reduction in arms, that is, disarmament, either in limited or extensive ways. It also includes the possibility of constraints on armament that may or may not entail a reduction of forces, of the sort sometimes described as "arms limitation"; for example, a weapon-test ban and deployment restrictions (e.g., disengagement) are "arms limitation" measures but not "disarmament" measures. And there is nothing in the concept of arms control to prevent the increase of certain types of armament, if it appears in the interest of national or world security to do so. Nor does the concept require the "cooperation" involved to be explicit or to be set forth in detail in a formal agreement; the cooperation may be tacit, partial, nebulous, or even grudging.* For example, the advocates of partial and graduated unilateral disarmament can make a strong case that this policy might, through economic and political pressures, induce others to follow suit—in other words, to "cooperate," without impairing national security in the process.

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* Many students of arms control prefer to reserve the term for measures that are explicitly agreed upon, and they would not concur in this extension. However, I do not see how otherwise to include graduated unilateral measures (among other things) as a special case of arms control.

A few cases in point will illustrate the range of possibilities. The recently concluded agreement to abstain from developing or deploying weapons or forces in the Antarctic is an arms-control measure—notable at the moment of writing as being the only one to which both the United States and the Soviet Union have explicitly and formally subscribed, but one that otherwise seems rather insubstantial. We have a more substantial but completely tacit agreement with the Canadians not to arm the border between the United States and Canada. The non-use of gas in World War II was a tacit arms-control measure, at least in the sense used here. To cease the production of fissionable nuclear materials would be an arms-control measure, as would general and complete disarmament—if it can ever be achieved. The point these examples are intended to suggest is that there is an enormous range of measures for cooperative security that nations might take to reduce the danger of war, most especially the danger of nuclear war, or to mitigate the consequences of war if it comes. But there are problems in arriving at such measures.

Hazards, Pro and Con. From the point of view of the United States (or any other country), any specific arms-control measure or program that has been proposed has two basic aspects: it may improve some component of our security, either in the short or the long term, and it may degrade some other—again, either in the short or the long term. Both the hazards it may protect us against or reduce (the "pro" hazards) and the hazards it may introduce (the "con" hazards) are often subtle, complicated, and difficult to understand. Indeed, they may not be at all apparent when the measure is first considered, and may never be completely understood. The problem of deciding whether or not the proposed measure is "actually desirable" is one of deciding whether the "pro" hazards do or do not outweigh the "con" hazards. Some brief indication of the nature of the problems involved will be useful.

The Central "Pro" Hazard. Most of us probably find it difficult to grasp what a nuclear war could be like. Numerical estimates of x million dead, y cities destroyed, and z percent of our industry obliterated seem unreal. Figure 1 shows photographs before and after of Nagasaki[25] that convey an immediate sense of the scale of the problem. The energy release of the Nagasaki bomb was equivalent to about 20 thousand tons (20 kilotons) of TNT. This size of weapon is now often regarded as "tactical," that is, suited primarily to use against troops and other forces in a limited nuclear war, rather than strategic bombardment. However, Figure 1 illustrates why Europeans and others on whose territory a limited nuclear war might be fought may be disinclined to view such a war as sufficiently "limited."

In several senses, Figure 1 is obsolete. Seven years after the Hiroshima and Nagasaki bombs, the first thermonuclear device was tested. The Soviets tested their first the following year. Today there exist thermonuclear weapons with an energy yield approximately one thousand times as great as the Nagasaki bomb, a yield measured in millions of tons, or "megatons," of equivalent TNT. It is often said that a single high-yield thermonuclear weapon can release more energy than all the high explosive used in the whole of World War II —perhaps more than was used in all past wars altogether. Most people have not yet really assimilated this development. To the present day, experienced newspaper reporters often confuse "kilotons" and "megatons." In their defense, it should be said that these units of measurement are indeed difficult to grasp. Even among professionals, I have observed an occasional tendency to think of "kilotons" as "tons." Figure 1 is a good antidote to this tendency and is worth occasional study as a reminder, whether "obsolete" or not.

There is another side to this problem. Nuclear weapons very much smaller than the Nagasaki bomb are possible. For example, weapons having a yield as low as 55 tons (0.055 kilotons) have been tested. Weapons having a yield of 10 tons or less could presumably be developed, and much of the motivation on the part of weapon scientists to continue the development of nuclear weapons stems from the possible development of weapons in this range. There is no question but that such weapons, which are sometimes overlooked by critics of limited nuclear war, would not produce anything like the damage indicated in Figure 1. And they probably would be militarily advantageous for the United States, *provided that they did not lead to the use of much larger weapons.* The difficulty, of course, is that as soon as one side achieved an advantage by the use of 10-ton weapons, the other side could promptly neutralize it (and possibly much more besides) by introducing 10-kiloton weapons.

Megaton-class weapons have not yet been used in war, and there is no analogue to Figure 1 to provide a graphic sense of their effects, for which numerical estimates must suffice. To begin with, a high-yield thermonuclear weapon can reduce a standard frame house to absolute rubble as far as 12 miles from the point of explosion, and leave one very seriously damaged as much as 20 miles away. This implies an area of blast destruction of several hundred square miles.

The radioactive fallout from a single such weapon can kill unprotected people throughout an area of several thousand square miles.

The cumulative effects of a large attack involving many such weapons are much more difficult to estimate. As of 1959, a hypothetical attack on the United States analyzed for the Holifield hearings[26] involved 263 bombs with a total yield of 1,446 megatons. It was estimated that this attack would produce 50 million deaths, 20 million serious casualties, would destroy or damage 50 percent of all homes, and leave the remainder radioactive from two weeks to a year.* Herman Kahn and his colleagues[27] have analyzed a hypothetical attack of the late 1960's that assumes a total fission yield† of 20,000 megatons delivered on 150 major cities in the United States, about half of which would necessarily have a population of less than 100,000. It was concluded that this attack would kill about 160 million people out of an assumed population of 180 million, in the absence of a substantial civil defense program.

It is instructive to compare thermonuclear-weapon yields to large natural forces. In the series of eathquakes in Chile in the spring of 1960, the largest shock was estimated to have an energy release equivalent to 200 megatons. This not only created great physical damage in Chile but also generated tidal waves that produced destruction and casualties as far away as Japan. The total yield delivered in a large-scale thermonuclear attack might be from 10 to 100 (or more) times larger than 200 megatons.

Such grim figures are only part of the story, however, as they only relate to what could happen—in other words, to the capabilities that now exist or that may exist. Yet we should not be very concerned over the capabilities if only we and, say, the British had them. The other part of the story is that it *might* happen. We do not expect Type A deterrence to fail, but it would be rash to assume that it cannot. There are a number of ways in which it might fail. Many such possibilities are set forth in the essay below by Kahn.

The "Con" Hazards. It should not be thought that any and all arms-control measures can be guaranteed as resulting in a net improvement. The major problem, and one that rightly troubles most critics of a casual approach to arms control, is the fact that in the present state of the world our need for armament is just as pressing as the need to take seriously the possibility and the consequences of nuclear war. In particular, as long as the Soviet Union (and perhaps somewhat later, China) has the capability of launching a surprise attack, armament to deter such an attack is necessary.

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* The real force of Secretary Herter's "cannot conceive" remark should be apparent at this point.

† A technical distinction; the total yield would be larger, perhaps 30,000 megatons.

It is worth an effort to put the contemporary problem in perspective, for reasons explained below.* Let us first consider the *likelihood* of a Soviet surprise blow. An extreme view sometimes encountered is that the Soviets will strike us at the first moment they see a reasonable chance of escaping overwhelming retaliation. Does this "preventive war" outlook really represent the Soviet doctrine that guides their actions?

The evidence seems overwhelming that it does not. To begin with, the Soviets for many years have been conducting among their own people an intensive propaganda for peace by means of films, radio and television broadcasts, and newspapers. It is conceivable that this campaign is merely a smoke screen (it can obviously be turned off at a moment's notice) but it would surely affect young men moving up into positions of power and responsibility, some of whom would be startled, to say the least, to discover that it was merely a smoke screen. In addition to their overt campaign, the Soviets are surrounded by many reminders of World War II, which hurt them very badly; to the present day, many of their cities still show scars.

Official Marxist-Leninist doctrine has never suggested a preventive war. To be sure, it has affirmed the inevitability of war, but one always envisaged as an attack on the Soviet Union by declining capitalist powers. Even Stalin apparently held that the capitalist powers would exhaust one another in war before they attacked the Soviet Union. More recently, however, Khrushchev, in an address to the Supreme Soviet that enunciated major policy, asserted that there is "no fatal inevitability of war."[15] Coexistence seems to be the order of the day, at least, as far as major military action is concerned.

It is sometimes reported in contemporary strategic literature in the United States that the Soviet Union has been taking steps for civil defense that might be considered suggestive. However, the extent of this activity is rather limited; it is more extensive than our present program, but much less than many proposed United States programs. The Russians do not appear to have a substantial program for shelter from fallout. It is certain that the Soviets have not been conducting drills for evacuating their largest cities, drills which would be spectacularly visible to consular officials and tourists, and which would seem imperative for a nation seriously considering an attack.

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* The ensuing discussion has been improved by the helpful comments of Harold Brown and H. S. Dinerstein at the Johnson Foundation Conference of 20-21 May 1960.

The weight of such evidence (of which this is only a fraction) *therefore suggests overwhelmingly that preventive war is no more* the guiding Soviet doctrine than it is the guiding United States doctrine. It is true that we cannot prove it is not; but neither can we prove many other assumptions of equal importance on which our policies are based.

To accept this fact does not by any means dispose of the problem. The central truth is that many of the goals of the Soviet Union conflict with those of the United States. It does not presently appear that any of these conflicting goals are such as both of us would be prepared to support by going to war. If this situation should ever develop, however, war of some kind is certain to result, and this is what imparts substance to the following problem.

The Soviet rulers are quite well aware that large-scale military power casts a certain shadow. They undoubtedly expect to achieve certain goals, *perhaps* only defensive ones, simply from the implied threat of military power. Indeed, all the gains the Soviets have achieved since World War II have been initially obtained without the use of any Soviet military force. We surely cannot treat the threat these forces represent simply as an empty bluff. We must therefore consider the possibility that they might some day feel that a goal for which they would indeed go to war was being thwarted, and that thereby they would be motivated to strike us. Even those Soviet citizens who count themselves our sincere friends could not give a guarantee against this eventuality.

It is necessary to establish some perspective on this problem, for our own strategy must be based, at least to some extent, on a reasonable appraisal of the opponent. Not everyone would agree. One able student of these matters has questioned the wisdom of guessing Soviet intentions, as I have been doing in asserting that preventive war was not guiding Soviet doctrine; and another has suggested that there would be some scope for successful arms-control agreements even if preventive war were the guiding Soviet doctrine. I do not believe that either of these views will stand a close scrutiny. If the Soviets were firmly and unequivocally committed to preventive war, they would surely enter an arms-control agreement with the sole objective of using it to enhance their relative advantage and diminish their losses in conducting that war—if only by postponing the war to a time of their own choosing. And if we were convinced this was their strategy, we should not wish to enter an arms-control agreement, but might rather double or triple our defense budget—which we have the capability of doing, though the Soviets do not—and spend a large fraction of the increase on measures to protect our population. This would make the world much more dangerous for the Soviets and much less dangerous for ourselves, and it would be likely to persuade them that the doctrine of a preventive war should be abandoned. This would not necessarily be the only, or even the best, course of action, but it illustrates a strategy that we have not so far pursued because in fact we do not think it necessary.

We do not know Soviet plans or intentions in detail, and in any event they are most certainly subject to modification in the light of our own policies. We are therefore faced with the necessity of designing our strategies and our armament policy for *some* range of possible Soviet strategies. We must take into account not only the pleasant possible Soviet strategies but also the unpleasant ones; and one of the unpleasant, if perhaps the least likely, is the real possibility of a Soviet strategy of preventive war, if not now, then at some time in the future. It must be recognized, however, that our own strategy will not be optimum for that particular Soviet strategy, any more than it would be optimum for the Soviet strategy that would be implied by a completely friendly outlook toward the United States. The problem cannot be solved simply by our being excessively conservative in designing our armament policies, as this would lead us straight to the problems discussed in Kahn's essay. Both our unilateral armament policy and also the possible range of arms-control agreements must be conditioned by our having a reasonable perspective of the world situation. We cannot escape the hard necessity of appraising our prospective opponents.

In particular, it is irrational to treat every Soviet arms-control proposal as if their sole motive in advancing it was to help them achieve world domination. On the other hand, it is worth emphasizing that both we and the Soviets do have conflicting national goals, and that the Soviets are intensely and skillfully opportunistic. It would be entirely possible for a carelessly drawn or carelessly inspected arms-control measure to present them with opportunities they might be tempted to exploit—whether they had originally intended to at the time of signing the agreement or not. Possibilities of this kind include the clandestine development, production, and deployment of prohibited weapons, the misuse of certain types of inspection systems to enhance the surprise of a surprise attack, and the subversion of group-decision procedures for applying force or sanctions. Some of the problems of this type are explored in various essays in this issue.

There are genuine hazards of a different type, associated with certain kinds of arms-control measures, that are less often discussed. These might be called "irritation" hazards, and they arise as follows. The basic origins of world tensions (and therefore of armament, with the consequent possibility of war) are hostilities between nations, and conflicting national goals. No one would seriously maintain that arms control *per se* could solve these problems, or that arms-control measures are certain to survive in the long run if these problems are not solved. But it is of course an important possibility that arms-control measures may contribute to the easing of these problems, and that in any event they should not be so designed as to aggravate these problems by introducing avoidable irritations.

Such irritations may be introduced by arms-control measures in any of several ways. Differences may arise in the interpretation of the agreement, in the methods of enforcing it, or over the question as to who is going to pay how much of the bill. Irritations that affect a substantial segment of the population more directly may stem from the operation of inspection systems. Inspection has sometimes been called "institutionalized distrust," and in fact that is what it is. A certain minimum of irritation is probably bound to arise out of inspection. But it is important to avoid aggravating such irritation. Most important, the operation of an inspection system should not in itself become the object of distrust on the part of the host nation. It would be tragic if the implementation of an arms-control measure or program produced temporary alleviation of some immediate problem at the expense of aggravating the basic problems to the point of the ultimate breakdown of the program, thus perhaps leading to war. This hazard is also a real one, but it can be minimized or even avoided altogether by paying it careful attention when formulating a control agreement and when designing an inspection system. To do so, however, it is necessary to keep clearly in mind the character of the long-term underlying problems, and it is not always easy to do this while simultaneously devising measures to deal with more immediate ones.

Various Goals and Measures

The basic goal of arms control, as has already been indicated, is to reduce the hazards of present armament policies by a factor greater than the amount of risk introduced by the control measures themselves. In other words, arms control aims at improving our national security in all its various short- and long-term aspects. This definition, unfortunately, is rather like a general statement against sin: no one would disagree until the specific "sins" were defined. Let us consider some of the specific examples currently being discussed or likely to be discussed.

Broadly speaking, approaches to arms control are of two kinds. The first is to examine current and projected armament policies, to isolate their major unnecessary hazards, and to attempt to reduce or eliminate these, one at a time, leaving the basic armament policies largely unchanged. This is the realm of *limited* arms-control measures. The second approach is to attempt a survey of the basic requirements for armament to implement the various types of deterrence that must be provided for the participating nations, and to adjust all types of armament to fit these basic needs in such a way as to give maximum net security. This is the realm of *comprehensive* arms-control systems. In both cases, of course, the analysis must consider both unilateral and reciprocal points of view and must take into account the performance obtained under both calm and stressed conditions, the possible consequences of clandestine or overt evasion or other failures in cooperation, the possible failure of various types of deterrence, and the irritations introduced.

Comprehensive arms-control programs seem much more attractive on several counts than do limited measures. The goals of such programs may be better matched to basic needs, they seem generally safer, they may provide economic savings through substantial disarmament, and they may actually require less inspection than a small collection of independent limited measures. Comprehensive controls are studied in some detail in the essay by Wiesner.

Comprehensive controls, however, have not proved to be at all easy to negotiate, and are not likely to be so in the future. Some of the reasons for this difficulty operate with little or no force in certain limited measures of arms control which may prove to be more negotiable. (This "may" is very weak; they well may not.)

Although the goals of such measures are limited in scope, they are not necessarily trivial. The major hazards stem, not from the armament *per se* in the possession of the major powers, but from the fact that it might be used. Several measures are aimed at inhibiting such use. For example, two of the hazards to our security are the "catalytic war" (i.e., the initiation of a major nuclear war by one of the smaller powers) and the "escalation" problems; the major goals of a nuclear weapon test ban are to eliminate the problem of catalytic war altogether (by preventing the spread of weapons to other nations) and to eliminate those escalation problems that might result from a limited nuclear war initiated by one or more of the smaller powers. Most of the various types of accidental war depend for their initiation on misinformation about what the other party is doing in a crisis; Schelling[28,29] has proposed the use of special surveillance forces whose primary goal would be to minimize such misinformation. Many other potential limited measures may have considerable merit, as is shown in Schelling's contribution below.

It is possible, and sometimes useful, to view arms-control measures of practically any type as intended to provide warning. In some cases, this objective is explicit, as with measures designed to monitor strategic forces and provide immediate warning when an attack is launched. Many of the measures proposed by the Western delegation to the Surprise Attack Conference were of this type.[30] However, even a very comprehensive arms-control program that provides a substantial reduction of military forces can be regarded as a measure to provide warning, but in this case the warning given would be a long-term strategic warning of hostile intentions. As long as such an agreement was functioning satisfactorily, it would provide some evidence that the participants did not intend to launch an overwhelming attack—they would not have the capability. Any observed failure of cooperation in the carrying out of the provisions of the agreement, such as the repudiation of the treaty, would then provide a warning of aggressive intentions. The amount of time this warning would provide might range from a few months to a few years, depending on the extent to which disarmament had gone and on the scale of the aggression contemplated by the violator. Intermediate types of measures would provide intermediate degrees of warning; for example, certain deployment restrictions, such as a disengagement of Soviet and United States forces in Europe, would provide a warning of from several hours to a few days. In general, the more severe the restrictions in force levels or deployment, the longer the warning time provided by the corresponding arms-control measures.

To pass to goals less military in character, it is entirely possible to employ arms-control policies for achieving political as well as military objectives. For example, it might well prove possible to achieve the political reunification of Germany (on terms acceptable to the West) in connection with an arms-control program that provided for the disengagement of Soviet and United States forces in Europe and for the disarmament of Germany. The evaluation of such measures is especially complex because the pros and cons to be balanced are so subtle. Indeed, such an arrangement might seem to be something of a horse trade; however, bargaining arrangements in which both sides emerge with net gains are not only possible but common.

A different type of political goal is found in the realm of propaganda. Some of the connotations of this word are unfortunate, for it is certainly a legitimate objective of our policy to achieve the allegiance of the other nations of the non-Communist world. The difficulty with this goal (at least for the West) arises when measures are proposed purely for this purpose; the objective is then likely to be self-defeating.

One goal often stated by major political leaders is that of freeing the economic resources now devoted to arms for other purposes. This might happen in a significant degree only with rather comprehensive arms controls, as far as the near future is concerned. Among contemporary students of arms control, it is fashionable (and probably correct) to point out that arms control is very likely to cost more, not less than present armament policies. This is because adequate inspection systems are likely to be sufficiently expensive to more than offset the relatively slight reductions (if any) in arms that may be achieved. (This would not, of course, nullify the value of arms control. We should be prepared to spend a good deal to achieve a less dangerous world.) In spite of such reservations, the goal of economic savings is nevertheless reasonable *qua* goal, and is worth stating explicitly.

One way in which arms control could lead to a safer world is rather indirect but deserves mention. This would be to educate the Soviets in mutually desirable strategies and armament policies. For this purpose, we would first have to educate ourselves in some detail as to what these were—which hardly prevails at the present time. But if we did understand these matters in depth, and if we did have specific arms-control objectives fixed clearly in our own minds, it is highly likely that we could persuade the Soviets (and others) of the desirability of such objectives. Also, if we were better prepared ourselves, we should then be in a better position to understand and evaluate Soviet proposals.

One goal of either limited or comprehensive arms control is to contribute to the solution of the basic problems of international hostilities and conflicting national goals. Besides taking care to avoid the hazards of unnecessary irritations, various constructive contributions are possible. For example, the careful design and use of mechanisms for adjudication and enforcement in arms-control programs may lead to an increased dependence on peaceful and orderly means of resolving conflicting national objectives. The very fact of implementing arms-control measures might therefore improve the world climate. This presumably accounts for the ardor of those arms-control advocates who think the military problems can safely be ignored. But it is quite possible that such an improvement would not result. This problem is one of the major imponderables of arms control. Bearing these reservations in mind, we may nevertheless count this as a goal.

To pursue this thought further, in order that inspection should not appear entirely as "institutionalized distrust," it is desirable, when feasible, to have an inspectorate perform constructive functions of direct utility to the host nation. This would provide experience in the cooperative operation of constructive international services and might tend to reduce national hostilities. It would also provide the host country with a minor vested interest in the successful operation of the inspectorate beyond that provided by the successful implementation of the arms-control measure itself. Better personnel would be attracted to the inspectorate. It is possible to find examples in which the addition of relatively small increments of men and money to an inspectorate may provide relatively large gains in its constructive utility. Such examples include: (1) the use of a network for detecting bomb tests so as to provide a permanent continuation of the International Geophysical Year; (2) the use of radar monitoring systems for missile-control purposes in connection with the peaceful exploration of space; (3) the use of inspectors of nuclear production to do radiation monitoring as a public health measure; (4) the use of inspectors of industrial production to provide industrial census information and production statistics. I do not know whether all these examples are feasible, and they are obviously insubstantial, but they suggest an approach that should be useful.

Conclusions

The foregoing enumeration of goals will surely leave many readers unsatisfied. It will seem much too optimistic to many and much too moderate to others. In particular, some readers will undoubtedly have noticed that I did not define the predominant goal of arms control as the total elimination of all war. Several students of arms control would do so, including one as eminent as Philip Noel-Baker. It is undoubtedly a desirable goal, and one well worth pursuing with vigor. But the obvious difficulty is that it may not be susceptible of achievement. It seems to me that attaining this goal is likely to require either a radical alteration in national outlook—which no one seems to have the faintest idea of how to accomplish—or the general acceptance of peaceful international machinery for adjusting conflicting national objectives. The latter may or may not be possible, but it should be noted that the machinery in question must be capable of dealing not only with the United States, the Soviet Union, and China, but also with Israel and the Arab powers, North and South Korea, France and the Algerian Nationalists, and so on. At the very least, this is likely to take a considerable time.

Yet we can use this time to good advantage. If in the meanwhile we can avoid major nuclear war, without necessarily resolving such problems as that of Berlin or the Algerian conflict, we shall have done something profoundly useful—useful to ourselves, to the several nations involved, and to Eastern and Western civilization.

A historical analogy may be appropriate here. The problem of achieving a decent world may seem much too difficult to permit much optimism as to a successful solution. I have even heard one critic raise the objection that we *ought* not to tinker with the political structure of the world when we do not understand the long-term consequences of our work. But the delegates to the Philadelphia Convention of 1787 who drafted the Constitution of the United States also faced the problem of too many uncertain choices—their problems were no less demanding and no less difficult than ours. But they tinkered well.

We have men today as capable as those who drafted our own Constitution; it is not necessary to wait for the once-in-a-century appearance of an Abraham Lincoln. And today we have added motivation because of the catastrophic consequences—nuclear war or appeasement—of possible failure. Will we be able to avoid failure if we fail to make the effort appropriate to the task?

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Basic Requirements of Arms Control

THE CONCEPT OF "ARMS CONTROL" includes any agreement among several powers to regulate some aspect of their military capability or potential.* The arrangement may apply to the location, amount, readiness, or types of military forces, weapons, or facilities. Whatever their scope or terms, however, all plans for arms control have one common feature: they presuppose some form of cooperation or joint action among the several participants regarding their military programs. Is such cooperation feasible between major powers whose national purposes are in basic conflict? Concretely, is there any basis for such arrangements between the USSR and the United States? If so, what are the conditions and limits of reliable arms control?

Definition of the Problem

Many are convinced that agreements for arms control with the Soviet Union are not possible or in the national interest of the United States. In general their view derives from some or all of the following propositions:

(1) Military forces are only the reflection of political hostility. They are not the source or origin of tensions and conflicts among nations. Consequently, it is futile to try to regulate or reduce military forces separately from their underlying political causes. When basic hostility is resolved, reduction in arms will follow automatically as the nations feel themselves more secure and less threatened. To attempt control of military forces before removing the political sources of friction or threat is to put the cart before the horse.

(2) The purposes of the Sino-Soviet bloc are fundamentally hostile to the non-Communist nations. In the Communist view the conflict between their "system" and any other is irreconcilable and

will be resolved only by the ultimate victory of the Communist order. Its leaders believe that Communism is destined to triumph throughout the world, and they intend to advance their cause by the vigorous use of all feasible means. Apparently, the Communist ideology no longer considers a global military showdown inevitable under present conditions. But the Communist leaders still define "wars of liberation" as "progressive," and have not abandoned the use of force (as in Hungary) or threats (as in Berlin) when either serves their interests.

(3) The Communists would not make or carry out any arms agreement in good faith. Any means are legitimate in seeking to promote Communist advance. Treaties are only instruments for pursuing their basic aims and will be violated or evaded as suits their interests. In 1939-1940, the Soviet Union overran and divided Poland and absorbed Esthonia, Lithuania, and Latvia, in flagrant violation of nonaggression treaties with each of these nations. Soviet disregard for commitments regarding Eastern Europe, and of its Potsdam obligations regarding Germany, is too well-known to need laboring.

It would be rash indeed to disregard these lessons in devising and analyzing any arms-control proposals. The grounds for distrusting the Soviet Union and its purposes should make even the optimistic cautious. The record of broken agreements should warn us not to rely on Soviet promises or good faith as the basis for arms-control measures. And the only safe course is to accept at face value the constant Communist assertions of their basic hostility to our social order.

But, this does not dispose of the problem. One could also cite many agreements which the Soviets have carried out. The crucial point is to understand what kinds of arrangements they can be expected to comply with and why. The safest premise is this: in breaking or keeping agreements, the Soviets *can be trusted* to pursue their own interests as they see them. Hence, measures for arms control should be reliable if they can be so devised that compliance will be more in the Soviet interest than evasion or violation.

Distrust is not, of course, limited to one side. The Soviets, reflecting Communist ideology, are deeply suspicious of the "capitalist" nations and of their "ruling circles," which are seen as ruthless and unscrupulous in maintaining and improving their power and position. Within this conception, however, they are expected to pursue their interests.

The remaining discussion will be mainly concerned with how to make compliance conform to self-interest, given the fact of basic antagonism and distrust. It will examine, *inter alia,* how far the first proposition above—the relation of politics and arms control—remains valid under modern conditions.

Basis of Common Interests

At the threshold is the question: How can the Soviet Union and the United States have parallel or common interests in measures to control armaments if their basic purposes are antagonistic?

The answer lies essentially in the changing nature of war, especially general war. Until recently, large-scale military force could be used as an effective instrument for the pursuit of political aims. An aggressor might hope to win and to benefit from his victim's defeat. Conversely, potential victims could normally assure their own security by confronting the possible aggressor with sufficient opposing strength, either alone or with allies, to deter attack or defend themselves if it occurred. The resulting balance might preserve peace for extended periods under favorable conditions.

The development of modern weapons has changed the situation radically. As always, threat has produced deterrent which has largely succeeded thus far in preventing large-scale war. But the military balance remains unstable, entailing substantial risks and burdens. More important, these conditions jeopardize both sides. The loss of one need not be the gain of the other. If large-scale war meant mutual destruction, it would not advance the political interests of either side; both would be better served, *despite basic political hostility,* by preventing its occurrence. Thus, military instruments, while still related to political conflict, have taken on a life of their own and have become a separate source of tension and danger. These matters are analyzed elsewhere in detail in other articles in this issue, such as Herman Kahn's. Here it is sufficient to explore them briefly in order to indicate the limits on unilateral action to cope with them.

One serious factor of instability arises from the disparity between offense and defense. The state of military technology puts a heavy premium on striking the first blow. Surprise attack not only could grievously injure the victim; it might also knock out much of his capacity to retaliate, so long as delivery systems remain relatively vulnerable. Even so, an aggressor would run a serious risk of severe damage from even a limited surviving retaliatory capability. While that situation prevails, an aggressor is not likely to be tempted to initiate an attack unless he believes himself in peril of an attack.

The sense of exposure and vulnerability, however, creates strong pressures for rapid reaction to strike in case of threatened or apparent attack, before the means of striking is jeopardized. The necessity for quick decision creates serious dangers of war by accident or premature response, due, perhaps, to the misreading or misjudging of warnings. Progress in reducing vulnerability by hardened, concealed, and mobile weapons may lessen these risks, but may also introduce new instabilities of their own; they may, for instance, complicate communication and central control.

The dynamic character of military technology forces each side to strain constantly to develop new or improved weapons systems in order to better its position or at least maintain the balance. Whenever one or the other achieves an earlier success, it creates tension and uncertainty and the necessity for adjusting on both sides. The rapidity of change entails the risk of rash action prompted either by a fear of imminent inferiority or by a belief, whether correct or mistaken, of overwhelming superiority. The latter could lead to efforts at blackmail which could precipitate unintended large-scale war.

The spread of nuclear weapons into the control of more and more nations seems likely to enhance seriously these risks of instability and to introduce additional ones.

The effort to maintain an effective deterrent and to keep up in the arms race will probably become more burdensome. In any case, the greater part or all of the effort will only serve to neutralize the capability on the other side. Neither alone can safely stop its frantic activity, but the question is certain to arise as to whether mutual deterrence could not be achieved at lower levels of forces and expenditure.

As even so brief a summary indicates, both sides have possible common or parallel interests* in preventing an unintended all-out war and in minimizing the burden of the deterrent. Each side can continue its unilateral efforts to make its deterrent more effective. If these efforts merely produce enhanced or more secure capacity to damage the opponent, the result will still be a system of mutual deterrence, subject to risks of the sort outlined. Conceivably, one side might achieve a technical breakthrough, reducing its own vulnerability to an opposing strike so radically as to destroy the "stalemate." But, the chances and value of that possibility must be weighed against the opposite danger and the other risks inherent in an unrestricted arms race. In making that appraisal, both sides could readily conclude that their interests would be better served by measures to stabilize the system or reduce its burden. There are limits, however, to how far this can be achieved by unilateral action. Certain kinds of measures useful for these purposes require joint action or cooperation. This objective fact must be the basis for any progress toward arms control under present conditions.

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* Since these parallel interests result mainly from hazards inherent in major nuclear-weapons systems, they extend to any activities or violence entailing risks of the ultimate use of such weapons. Hence, the desire to mitigate that danger can be the basis for measures to control conventional weapons. If the use of such nuclear-weapons systems were, however, fully neutralized by technology (as might happen) or eliminated by arms-control measures (as seems remote), would this common interest persist for controlling conventional weapons? It might not if a potential aggressor considered that nuclear-weapons systems had been finally removed from the equation; but that condition is hardly likely to be fulfilled, at least by arms-control measures. Moreover, even in that case, there could be a common interest in reducing the burden of conventional forces if both sides concluded that a standoff existed in such forces and could be maintained at lower levels.

Criteria of Acceptability

The thesis of this paper is that the validity and stability of any arms-control system will depend ultimately on the same kinds of motives and factors as those which underlie the existing "system"—namely the self-interest of the parties. Arms-control measures broaden the arsenal of instruments available for constructing and reinforcing a viable deterrent system by means of agreed standards, limitations, or safeguards. They may serve to reduce the likelihood of war, or (possibly) the burden of effective deterrence. But any proposed system of arms control must be judged by whether it makes it more attractive to the parties (in terms of their own interests) to maintain the system and its safeguards than to disrupt it by resorting to violence or evasion.

Constructing an arms-control plan that meets such a test is far from easy and must overcome serious technical and political obstacles. The existence of common interests does not assure that practical methods for working together are attainable. To establish arms control, the parties will have to be in accord on: applicable limitations; methods of verifying compliance; and the consequences of violation. These three aspects, which interact as will be discussed later, may affect the several parties differently. In appraising any plan, each party will compare its benefits and risks under the plan with its prospects without it. Before accepting any plan, each nation will have to be satisfied on two issues:

First, if carried out according to its terms, how will the plan serve its security or other interests compared to the situation without it? Will it lessen the risks of war, whether deliberate or unintended? Will it allow reductions in military expenses without loss of security? These two aims are not necessarily complementary. Some joint actions to stabilize deterrence might even require increasing expenditure. For example, if the all-out nuclear deterrent were virtually neutralized, stability would depend on the balance in other weapons and forces. Unless attained by major reductions in Soviet and Chinese forces, this would probably require increases in those of the West.

And, second, would possible violations of the arrangements entail undue risks to its security compared to the situation in the absence of the arrangements?

In essence, this question breaks down into several parts. What are the chances that another party could evade some or all of the agreed limitations without prompt detection? How seriously might any such violation upset the military balance? Could the victims redress the balance or compensate for the violation if detected, and, if so, how rapidly? What detriment might the violator suffer from detection? Taking all these questions into account, how likely is it that evasion would be attempted? And, how do these risks compare with those without an agreement?

To be acceptable, any arms-control plan must combine its limitations, safeguards, and remedies so as to satisfy both criteria for all parties. In seeking to do so, it is essential to understand how these several elements may reinforce each other or conflict, and what limits they impose on the feasible scope of such a system.

The remainder of this paper attempts to analyze some of these limits and interactions and their implications. Its purpose is not to develop a specific proposal but to examine certain conditions and relations inherent in the situation, which apply to any arms-control measures in existing circumstances.

Balancing of Restrictions

One serious obstacle to arms control arises from the difficulty of equating the impact of specific restrictions or other terms on the several parties. The task of assessing the effect of any acceptable change in military forces or armaments on the absolute and relative capability of the parties is extremely complex.

Since the armed forces of each nation rely on their own special "mix" of armaments and men, any restriction of a particular weapon has different impacts on each of them. In the 1930's enormous amounts of energy and time were devoted without success to efforts to equate different kinds and numbers of conventional weapons. Nuclear weapons and missiles have, if anything, made this task even harder because of the wide range of uncertainty regarding their effects on offense and defense and the relations between nuclear and conventional capabilities. Moreover, with dynamic-weapons technology, each side is likely to be ahead in developing specific fields, and therefore will appraise the prospects and significance of newer weapons in quite different terms. Especially under these conditions, military experts on each side almost inevitably tend to overestimate the harm to their capability from any proposed restriction and to discount its effects on the potential enemy. Hence, the greater the uncertainty regarding the value and equivalence of weapons and forces, the more likely is the conservative bias on both sides to block agreement on any material change.

A second obstacle arises from differing appraisals by the United States and USSR of the value and costs of inspection inherent in the divergence between a "closed" and an "open" society. Effective inspection is more vital for the United States than for the USSR. The vast range of published data on the United States military programs available to the USSR through the press, Congressional reports and hearings, etc., would greatly reduce its dependence on the inspectorate, and provide cross-checks and leads for its operations. Moreover, the very nature of an open, democratic society would make it far more difficult, if not impossible, for the government to carry on any large-scale secret evasion or violation, even if it desired to do so. Conversely, the closed character of the USSR necessitates more intensive inspection to provide data and greater dependence on the data so obtained with fewer chances for cross-checks, etc. Hence, the United States is forced to insist on a degree and reliability of inspection for which the USSR is likely not to feel a corresponding requirement.

In terms of costs or burdens of inspection, the appraisals will also differ. The Soviets undoubtedly look on their secrecy as a military asset. In allowing it to be pierced by inspection, they consider they are making a separate, or additional, sacrifice of their military potential. Hence, they will assess the cost of reciprocal inspection (particularly, if intensive) as high, especially as compared to its value for them. The United States will certainly not estimate the burden as nearly so great, though it might appear more onerous (at least for private activities) if negotiations ever got down to practical details.

The consequence is that, in striking a balance between costs and value of inspection, the United States will inevitably favor more intensive and thorough systems and methods than the USSR. In this respect their interests tend to diverge materially and to obstruct agreement on a common system.

Their interests may diverge in another respect. A system which succeeded in neutralizing the all-out deterrent could have ancillary consequences differing according to the purposes of the two sides. For the Soviets, widespread confidence in the system might make it more difficult to utilize the fear of war for attaining political advantages. For the United States, one result might be to narrow the value of the all-out deterrent in inhibiting aggression in peripheral areas. Today, lack of certainty about its use may deter rash Soviet action, especially where the stakes are small compared to the price of a mistaken judgment. Some forms of arms control, by more effectively neutralizing the strategic capabilities, could erode this effect in the less vital areas. Finally, the prospect of rapid technological change complicates the creation of an acceptable system. Where radical innovation has become usual, a nation may hesitate to tie its hands too tightly when the future is so uncertain.

Limits of Inspection

Inspection (used here to mean any method of obtaining or verifying evidence) has come to be the cornerstone of arms control. Indeed, it is often said that inspection must be "foolproof." If, in fact, 100 percent certainty were required in the inspection system, virtually no arms control would be feasible. In practice, no technique depending on human skills and judgment can be infallible. This truism is especially applicable in a field where actual experience is so lacking. Moreover, the Soviet Union (certainly) and the United States (probably) would not agree to inspection of the scope and intensity which would be necessary to attain the highest feasible reliability.

But infallibility is not the proper criterion. Inspection should be viewed as a technique for reinforcing and maintaining the self-interest of the parties in the continued effective operation of the system. The restrictions and the related inspection should be considered as a system of deterrence. Their combined aim should be to create *risks* of detection which a rational participant would not consider worth running. He need not believe that the inspection techniques are certain to discover the violation: he need only be convinced that the odds of discovery are too high to make the attempt worthwhile in the light of the possible benefits and costs. Of course, the reliability of the inspection process is still a vital factor in determining the extent of feasible arms control. But it can not be judged in isolation. It is intimately related to the nature of the restriction and remedies included in the system, and to the interest of the parties in its continued operation.

This interplay is apparent even when the primary purpose is to provide reciprocal information for reassurance or the avoidance of mistakes, as in some schemes for preventing accidental war or for inhibiting surprise attack. Inspection to prevent mistake or surprise may be greatly facilitated by agreed-upon restrictions concerning readiness or disposition (of strategic air forces or missiles, for example) which would almost surely have to be violated to mount such an attack. Inspection could not prevent such restrictions from being disregarded, but their existence would enable inspectors promptly to interpret as hostile an action which might otherwise be ambiguous.

For any specific restriction, the potential violator will weigh the value of the evasion against the risks and consequences of detection. He will hardly assume the risks of discovery (whatever they may be) unless he can foresee some commensurate advantages. Thus, the crucial question is not whether the inspection system could discover every *technical* evasion, but what prospects it offers for detecting any *significant* one. In assessing this, several factors become relevant.

One is the scope and duration of activity required for a significant violation. If evasion had to be carried out on a large scale or over a long period before yielding benefits, there would appear more chance of its detection by cross-checks or random sampling or other means. Thus, if conventional military equipment had been reduced to a certain level, its replacement in substantial amounts should be reasonably risky with even moderate inspection in operation.

Also, the amount of clandestine production required to be "significant" would also depend on the levels to which agreed reduction had dropped. If other powers had reduced virtually to zero, relatively small violations might give the offender a great advantage. But if they retain major capabilities, much larger evasions would be necessary.

In assessing advantages of evasion, the violator must think in terms of usable weapons systems—fragmentary evasions may not give any real superiority. Thus, if restrictions were applied to existing nuclear material, the fact that it could be secreted in little space without continuing activity would make the prospects of detection very small indeed. The significance of a violation, however, would depend partly on the level to which others had reduced and partly on how much else the violator would have to do to make his secret stockpile usable. Added safeguards might arise from other reinforcing restrictions which could be inspected more readily—such as limits on delivery vehicles which might involve a much wider range of activities for evasion.

Inspection seems likely to present some of the hardest problems at the start of an arms-control system. Time will be required for it to be organized and installed, to gain experience, and to earn the confidence of the participants. Moreover, at that stage, the degree of intensity of inspection is most likely to seem out of proportion to the modest initial restrictions or reductions: checking on certain kinds of isolated limitations could require nearly as much probing as that for more extensive reductions. For this reason, under a comprehensive system put into effect by successive stages, the inspectorate would hardly need to expand in step with the restrictions. In selecting initial limitations, therefore, one major factor should be to find those which minimize the scope and burden of inspection.

One method for facilitating inspection at all stages is to require the participants to prove their compliance with specific obligations. They may be in a position to produce convincing evidence of their action much more easily than inspectors could establish the facts without assistance. The making of reports of various kinds by the parties can serve a similar purpose of facilitating inspection. The early stages of a system should capitalize on such techniques by beginning with limitations for which they are especially helpful.

The nature of the inspection system and its value are also related to how the data it produces will be used. The deterrent effect will be affected by how violations are established and redressed.

Measures Relating to Violation

Since the purpose of the inspection system is to assure compliance, a central issue involves the treatment of violations. Actually, two factors are involved: the method for determining that a violation has occurred; and the remedies available for redressing it.

Determining Violations. In considering procedures for determining violations, two alternatives can be conceived: the inspectorate could be required to produce and submit evidence of any violation to an impartial tribunal which would judge the issue like a court; or the evidence could be furnished to the parties for their information and decision as to how to act on it. Some have taken for granted that the first method was inevitable or desirable.

This is by no means self-evident. In some cases, the state of the evidence may require a court to find that the violation is not proved despite suspicious circumstances. The other parties may still suspect evasion, and be tempted themselves to evade in "self-defense," if the decision of the court leaves no alternative. If the parties have the privilege of deciding how to interpret and act on the suspicious data the deterrent to violation may be enhanced. The practical effect might be that they could then take overt counter-measures. Indeed, they could announce the protective counter-measures, and offer to withdraw or terminate them upon satisfactory proof that the suspicions were unfounded. The suspected party would then have a real interest in establishing innocence. And it will frequently be far simpler for him to offer persuasive proof that he is not in violation than for the inspectorate to prove the real state of facts. Consequently, if the system is designed to serve the continuing interests of both sides, the right of the parties to interpret suspicious evidence may be better calculated to maintain the viability and stability of the system than final authority in a tribunal for this purpose.

There are, however, considerations favoring a tribunal. Any agreement will entail some ambiguous provisions on which there is room for legitimate dispute. Both sides might well be willing to allow a tribunal to resolve the issue. Similarly, it may be useful to have a forum for presenting evidence of violations, especially where clear, in order to exert pressure on the violator or to have the support of a judgment of the tribunal to justify any counter-action the victim might decide to take.

Hence, the best solution may be to seek to combine both methods. To obtain the benefits mentioned, a tribunal could be available for resolving disputes about the terms of the agreement or the evidence of violations; but the parties might still have the right to suspend or cancel the agreement if the result seemed to require it for the protection of their security.

Remedies for Violation. What remedies are available in case of violation of the arms agreement? The answer to that question sets a basic limit on the kind and extent of restrictions which are feasible.

In their comprehensive plan for world disarmament, Clark and Sohn provide for an international agency with authority to require compliance and adequate power for enforcement. No such agency now exists. Even if the International Court had compulsory jurisdiction to determine a violation, it would lack effective means to enforce its decree or to provide remedies to the other parties. Under existing political conditions, the Soviet Union and the United States could not agree to create an international agency with sufficient power to coerce their compliance with its decrees. The existing distrust and cleavage make joint action for that purpose wholly impracticable.

If that solution is now unfeasible, it is essential to realize that dependence in case of violation must be placed on self-help. Consequently, in making any agreement, the parties must seek to appraise the following: if they fulfill their obligations under the agreement, how will their relative capability compare with that of a violator who has whatever advantage he could reasonably be expected to obtain by evasion before detection? The crucial question is whether or not the honest parties would still be able to assure their security under these conditions. Would the violation be likely to upset or jeopardize the deterrent balance?

The answer to the question depends on a variety of factors involved in any specific plan. Of course, if the plan affects the capabilities of either side only in ways readily rectified or reversed, its cancellation could leave the parties substantially where they had been before its adoption. Some forms of limitation might operate in much this way. For example, the plans for depositing weapons in international stockpiles on the territory of the several members are designed to have this effect. If one party should reclaim his weapons, others might quickly follow suit.

Moreover, the effect of a violation depends on the general level and character of forces retained. Smaller evasions might not be really significant to upset the balance if major deterrent forces were kept in being by all parties; but, as the general levels were reduced more and more, the significance of the same violation could grow.

Violations which do not threaten to upset the military balance might be more difficult to handle. For example, one party may impede the work of the inspectorate in various ways which infringe on their rights under the agreement. The experience under the North Korean Armistice offers many examples of such methods. The other parties might be loath to terminate the agreement with all that would entail, just as was the case in the Korean Armistice. They might, however, be able to resort to lesser pressures to coerce compliance, such as imposing similar restraints on inspection (which might not be adequate) or suspending other provisions or restrictions until the noncompliance was corrected. Of course, this could lead to an ultimate breakdown of the agreement—but it would confront the offender with the necessity of choosing whether to comply or to run that risk.

In deciding whether or not to attempt a major evasion and risk detection, however, a potential violator would have to weigh a wider range of considerations.

An evasion might so shock and solidify world opinion against the violator as to create a stronger coalition against him than would have existed beforehand. It could produce crash programs of rearming such as resulted from Korea. Moreover, the violator might run a serious risk of provoking preventative action based on the conviction that the other parties have no choice in view of his demonstrated perfidy. The uncertainty and unpredictability of these consequences would be likely to exercise very great restraints against major violators.

Conclusion

The basic point should be stressed again: no arms-control plan will remain effective and dependable unless it continues to serve the national interests of each of the parties, as its leaders conceive those interests. In reaching their judgment, however, they will appraise the alternatives. The main function of inspection and of the remedies available to the other parties is to make evasion unattractive as an alternative course. To achieve that result, the inspection system should confront the potential violator with risks of detection and counter-measures outweighing the significance of the violation for the relative capabilities of the participants. The system as a whole must be designed to offer benefits to all participants which they are likely to prefer not to jeopardize.

The analysis leads to one tentative conclusion. It may be wise for the agreement to allow any participant to withdraw at any time (or after relatively brief notice) without cause. Such a privilege has several merits.

First, it emphasizes the fact that the validity and continuance of any plan depends on its *continuing* appeal to the self-interest of the participants. It underscores the fact that their *promise* to comply should not be the basis for reliance.

Second, it resolves the problem of the determination of compliance or violation. If one party becomes suspicious of another's compliance, he can protect himself at once by suspending some or all of his own obligations. The threat to do so, or conditional suspension, could be one means to require the suspected party to provide positive evidence of compliance.

Third, such a provision would underscore the necessity for each party, either alone or with allies, to be able to protect his security at all times if the agreement breaks down. This again is calculated to forestall any false reliance on the agreement which it can not provide, and to confront each participant constantly with the need for realistic appraisal of the operation of the plan.

Fourth, it would meet the problem of revision of the agreement. An arrangement in this field may not operate exactly as anticipated, either with respect to restrictions or safeguards. As a result, they might bear unfairly on one or more parties. Moreover, technological progress could easily skew the initial effects of a plan in favor of one side or the other. It would be extremely difficult, if not impossible, to prescribe detailed procedures for modifying or revising the plan by arbitration or other usual methods for breaking deadlocks. The privilege of withdrawal may be the simplest way to force renegotiation where justified.

It must be recognized, however, that such a privilege has some drawbacks. The fact that ending the agreement would not entail the breaking of a commitment might reduce the pressure to preserve the system under some cases. In practice, however, that pressure could hardly prevail if the continuance were considered to imperil the security of a party for whatever reason. In the case of the democracies, it might delay the decision somewhat more than in the dictatorial regimes.

Even with the privilege, however, there would still be substantial forces inhibiting a participant from withdrawing from or upsetting a working system for light causes. The dangers of reviving an urgent arms race with less likelihood of renewing arms control later would normally give serious pause. Such action, if taken for arbitrary or narrow reasons, would also involve major political costs all over the world, and, at least in the democracies, at home as well. Consequently, if the system were operating fairly and effectively, it seems reasonable to assume that the privilege of ending it would not be used casually by any major party. So long as they felt the system served their security interests, they should also be able to assure that its continuance would not be jeopardized by the withdrawal of others.

The privilege of canceling or suspending could be used as a very flexible device. The choice need not be all or nothing. A party could suspend specified portions of the restrictions or other provisions commensurate with the violation or evasion, or adequate to adjust to changed conditions. Moreover, any such suspension could be made conditional, or to be effective after a certain interval, in order to induce a negotiation for agreed modifications in the agreement. The experience with the Korean Armistice indicates that changes can be made in this manner without destroying the agreement, even when it contains no such privilege. In that case, the Communists introduced planes into North Korea contrary to the armistice; thereafter, the United States, in compensation, suspended certain restrictions on bringing new weapons into South Korea. Despite these changes, the armistice itself has remained in effect.

Some may feel that the foregoing analysis is unduly pessimistic or that it virtually forecloses any prospect of an extensive arms control. That, in my opinion, is not a proper conclusion. Within the limits discussed, there is room for substantial measures to stabilize the deterrent and to make initial modest reductions. Moreover, experience with inspection, and the application of imagination and invention to developing its techniques, could broaden the area for further measures. In particular, by cooperation through such means, the major opponents might be able to work out ways of maintaining the strategic deterrent at lower levels of resources and expenditures, especially if newer generations of missiles create the possibility of relatively invulnerable defensive capability. If their role comes to be recognized as one of essentially mutual neutralization, more modest levels might be adequate within an operating arms-control system. Moreover, in such a context, a reduction in the levels of conventional forces is within the realm of feasibility and could serve to lower the general level of defense expenditures below what otherwise might prevail.

These prospects fall well short of total disarmament. But realism seems to require recognition of the fact that such a state can be approached, if at all, only under conditions which permit international enforcement to operate effectively. In particular, it appears to call for an international agency with adequate authority and coercive means to punish and constrain a violator of the system. And that presupposes such fundamental changes in the political sphere as would pose a different range of problems within a new context. Such changes, if they occur, will depend on a wide range of policies and actions, involving many fields besides arms control. Limited progress in arms control to stabilize the situation will help in providing the time for such other actions to produce results.

WILLIAM R. FRYE

Characteristics of Recent Arms-Control Proposals and Agreements

THROUGHOUT RECORDED HISTORY, dedicated men and women have sought to limit the destructive effect of human quarrels and reduce their incidence by controlling or eliminating the instruments with which men fight. The effort has been very largely futile. It has been likened to the legendary medieval quest for the Holy Grail, that "cup hanging in the sky like a burning jewel" for which so many knights of the Round Table searched in vain. Invariably those setting out on the quest for arms limitation and control have sought to restrict or eliminate primarily the instruments with which their enemies were best supplied, or in the use of which the enemy was most proficient. (One's own weapons never threaten the peace; they are defensive in character.) An element of society which was superior to its adversaries in power would refuse to sacrifice that superiority, and one which was inferior would resist curbs on its efforts to close the gap. Except for theologians, few have probed at the root causes of the quarreling—the fear, greed, hatred, and lust for power in men's minds. The causes being untouched, the derivative instruments were virtually impossible to control.

The advent of the nuclear age in 1945 gave new impetus to the quest for disarmament, but did not make it any easier. On the contrary, it immensely complicated the task. Whereas previously the advantages to be gained or lost from a badly negotiated or imperfectly executed disarmament treaty were important, now they were quite literally matters of life and death for whole nations and alliances. "A quantity of plutonium—probably less than would fill this box on the table," said the then British Prime Minister, Winston Churchill, patting the dispatch box in the House of Commons, "and quite a safe thing to store—would suffice to produce weapons which would give indisputable world domination to any great power which was the only one to have it." The risks of *not* negotiating an agreement on arms control were also multiplied by the atomic age; but these risks seemed less immediate in many eyes.

Perhaps the first recorded effort to limit manpower and armaments was the agreement reached in 600 B.C. by the Chinese states of the Yangtze Valley. Tired of recurrent wars, they entered a disarmament league and were able to achieve 100 years of peace. In modern times, in the Rush-Bagot agreement of 1817, the United States and Great Britain, recently enemies in the war of 1812, agreed to limit their naval power on the Great Lakes to three vessels each, of equal tonnage and armament. The arrangement worked well and helped lay the basis for nearly 150 years of peace on the Canadian-American frontier.

Efforts toward Disarmament before 1945

Instances of successful arms limitation, however, are few. In 1899 and 1907, there were efforts at The Hague to curb the arms race which preceded World War I; but they failed. Between wars, the effort for disarmament was redoubled, but it had no lasting results. The 5-5-3 ratio among the navies of the United States, Britain, and Japan, established at the Washington Naval Conference in 1921-1922, remained binding for only a few years. By the end of the 1920's, Japan was openly demanding, and covertly achieving, the power necessary for her outward thrusts of the '30's and '40's.

The Covenant of the League of Nations had committed its members to the proposition (Article VIII) that "the maintenance of peace requires the reduction of national armaments to the lowest point consistent with national safety and the enforcement by common action of international obligations." Efforts to carry out this principle, however, broke down over the question of which came first, the chicken of national safety or the egg of arms reduction. The same basic dispute had preceded, and would follow, the League of Nations debates. Britain, the Scandinavian countries, and the United States (the latter, of course, not a League member) argued that disarmament would produce security and peace; France, Belgium, and Eastern Europe wanted to give priority to national security.

Efforts were made to satisfy both schools of thought. A preparatory commission was set up in 1925 to explore the ground of disarmament. It did much useful technical work and studied a number of plans, including a spectacular plan for total disarmament offered in 1927 by Maxim Litvinov, then the foreign minister of the Soviet Union. (A generation later, Moscow was to return to this theme with similar fanfare.) Meanwhile, there were also explorations in the realm of security. The Geneva Protocol of 1924 was the first of several attempts to ease France's fear (well justified, as subsequent history proved) of a German military revival. Other such efforts to buttress European security included the Locarno Pact of 1925 and the Kellogg-Briand Pact of 1928. But none provided genuine security —in considerable part, no doubt, because the United States, gripped in postwar isolationism, held aloof. Denied the essential precondition, France refused to disarm. The world disarmament conference of 1932, one of the best prepared conferences in history, broke down on what was essentially the same basic issue, though many other cross currents of politics and diplomacy played their part.

In retrospect, France's proposals for security first, through an international police force, and for strict control over all disarmament appear sound and far-sighted. Indeed, they could be projected with little change into the year 1960. But they were minority aberrations at the time. They became majority views only after the United Nations came into being in the 1940's.

Chapter VII of the United Nations Charter provided for security through a world army. All UN members were obliged to contribute "armed forces, assistance, and facilities" to it (Article 43). The eleven-nation Security Council was placed in charge; and on the assumption that the five great powers would cooperate, they were given full control over the army's establishment and use. That provision was, of course, a fatal weakness; negotiations in the Military Staff Committee broke down on questions of organization and composition, and could not be resolved in the Security Council because of the rule that on all matters of substance the great powers must be unanimous. The Soviet Union of 1945-1948, engaged in spreading its power and influence through eastern and southeastern Europe, was not interested in establishing a world-wide system of collective security which would curb those ambitions. The West eventually set up a substitute security system for Europe in the form of NATO.

Lacking global security, the members of the UN, like the members of the League of Nations before them, set out to attempt disarmament first. They were no more successful. Under cold-war conditions, the goal was remotely feasible only if two conditions were strictly met: that no step be undertaken which would compromise the relative military power of any participant; and that all participants be certain their adversaries were faithfully carrying out their obligations. Disarmament without security, in short, would have to be balanced on a knife edge and subject to the most stringent international controls. In the nearly fifteen years of negotiations which have been conducted in the atomic age, everything from limited "first steps" to comprehensive total disarmament has been discussed, but only one measure—a ban on the testing of nuclear weapons—has been found which both East and West considered would hurt the other's power posture as much as its own and in which adequate control seemed politically feasible. Critics of the test ban, moreover, have constantly challenged both assumptions.

The Advent of the Nuclear Age

The Western powers first attacked the problem of the nuclear age on a broad front, seeking the elimination of nuclear weapons for all time. When this did not prove feasible, they accepted the inevitability of such weapons, at least in a few hands, and set out to make the world as safe as possible under that Damoclean sword.

On 15 November 1945, the United States, Britain, and Canada, which had combined their wartime efforts in making atomic bombs and thus had let loose the genie, proposed that it be returned to the bottle. They asked that a United Nations Atomic Energy Commission be established for the purpose of "entirely eliminating the use of atomic energy for destructive purposes." The awesome fate of Hiroshima and Nagasaki had stirred world demands for such elimination, and the three-power proposal was in large part a response to those demands. It also served a further purpose: the proposal and the steps which followed it firmly fixed in the public consciousness the fact that under certain circumstances the United States would give up its new weapon, despite the temporary damage such a sacrifice would do to its strategic posture. This, in turn, gave the United States the moral freedom to use that weapon if, as the result of Soviet obstructionism, the bomb remained in the American arsenal and the Red Army then went on the march. In short, one of the principal effects of proposals to eliminate the atomic bomb was to strengthen the national security of the United States and its allies by helping to make credible the threat of atomic retaliation. Such proposals strengthened the bomb's value as a deterrent. All during the period of American atomic monopoly and for years thereafter the Soviet Union for its part did everything possible to neutralize the A-bomb by portraying its possession and use as immoral.

Moscow attempted to reimpose the moral restraints which the Baruch Plan had cast off. This was the strategic meaning of its "ban the bomb" propaganda.

From the beginning, as we now can see in retrospect, there was no likelihood that the Soviet Union would agree to the Baruch Plan. This fact may have been its principal virtue in the eyes of some cynics, though there was also a great deal of idealism and dedication in the minds of many of the authors of the plan. The United States proposed to destroy all its bombs and share its peaceful atomic know-how—indeed, to turn over all its atomic energy establishments to international ownership and management—if the Soviet Union and all other countries would agree to similar treatment of their future atomic industries. The UN was to have a complete monopoly of atomic energy for peace. There was to be no atomic energy for war.

Taken at face value, history has seen few such magnanimous gestures. In Soviet eyes, however, this was an effort to perpetuate indefinitely the American monopoly. Stalin saw little difference between United States control of atomic energy, and control by the proposed International Atomic Development Authority, a majority of whose members would presumably be friendly to the United States. The capitalist West, as he saw it, would own, manage, or license a substantial segment of the Communist economy, that segment which would be related to or dependent upon atomic power. Moreover, the Soviet Union would never be able to obtain legitimately the know-how to build atomic weapons (since all legal research would be under UN auspices), whereas United States personnel would retain that know-how and could fall back upon it in an extremity. Indeed, existing American bombs would not be dismantled until after the control system had been established and was adjudged to be in "effective operation"—a judgment which the Russians professed to believe would be indefinitely postponed.

Whether for these reasons or simply because the Kremlin was determined to possess nuclear-weapons capacity, it utterly rejected the Baruch Plan. In an effort to combat its propaganda appeal, Soviet delegate Andrei Gromyko proposed on 19 June 1946—four days after the presentation of the Baruch Plan—what was to become the Soviet leitmotif: that atomic weapons be prohibited by decree. Gromyko offered to join in formulating a control plan, but did not then offer one. An unenforced obligation of this kind might have been persuasive in the atmosphere of the 1920's, which had given birth to plans "outlawing war," but it was wholly inadequate, even as propaganda, in the 1940's. Rarely before or since have the United

States and its allies held such unchallenged mastery of the propaganda field.

In June 1947 the Soviet Union made its first serious move to pull abreast. The lines along which disarmament debate was to be waged for the next ten years thereupon became visible. Gromyko now offered a control plan. Whereas Baruch had proposed the international ownership and management of atomic materials and processing plants, the Soviet Union suggested that they be left in national hands but made subject to inspection. The inspection was to be fairly extensive but periodic, with special inspections on suspicion of violation. Control would begin after the United States had destroyed its bombs.

East and West: Chief Points of Conflict

Two fundamental differences between East and West thus emerged. Whereas the United States thought of control in terms of ownership, management, and veto-free authority to punish violators, the Soviet Union thought of it as inspection only, with punishment left in the hands of the veto-bound Security Council. The very word "control" in Russian and French means to check, to inspect, to verify; one "controls" a bank statement at the end of the month. By contrast, the United States believed, as the Baruch Plan said, that "there is no prospect of security against atomic warfare in a system of international agreements . . . which relies [only] on inspection and similar police-like methods." Not until well after the Soviet Union had broken the American atomic monopoly (making the idea of "condign punishment" academic), and after the accumulated production of fissionable material had slipped beyond the point of foolproof audit (making a complete ownership transfer unverifiable) did the United States alter its view. Today, "control" and "inspection" are virtually synonymous for both East and West.

The other major difference between the United States and the Soviet Union in 1947 was on the timing of disarmament and control. The United States wanted control first and the scrapping of bombs second; the Soviet Union sought to reverse that order. This difference seemed to have been overcome in the early and mid-1950's, when the concept of simultaneity gained wide acceptance; but in 1960, at the ten-nation disarmament conference in Geneva, the two sides found themselves back at the point from which they had started in 1947, arguing which should come first, disarmament or control. It was a more sophisticated argument in 1960, since both sides professed to want disarmament and control simultaneously; but, with considerable justice, each accused the other of deviating in practice from the agreed norm.

The 1948 UN General Assembly gave overwhelming endorsement to the Baruch Plan, as the UN Atomic Energy Commission had done before it; but this fact had no appreciable effect on the negotiating process, however greatly it benefited the Western moral position. "We are willing to disarm, but the Russians won't agree to control" became the virtually universal popular impression of the situation, an impression which of course contained a large element of truth and which persists to this day, even in fields where Western willingness to disarm could legitimately be questioned. The popular appeal of the Baruch Plan placed Western policy makers under great temptation to avoid public pressures for distasteful steps by linking them to more inspection than the Soviet Union would be prepared to accept, thus effectively shifting to Moscow the blame for lack of progress and perpetuating the popular impression of the East-West postures.

The Soviet Union set off its first atomic explosion in 1949. This achievement, breaking the American monopoly, basically changed the terms of reference of the negotiations, but governments were slow to acknowledge the change and make the necessary adjustments. The United States began hinting in 1950 that it knew the Baruch Plan was out of date; in 1951 it reconfirmed the plan only "unless and until a better or no less effective system can be devised." But it was not until May 1954, after the Soviets had exploded a hydrogen bomb, that the key features of the Baruch Plan—ownership and management—began to disappear from American proposals.

Meanwhile in the early 1950's Jules Moch of France, virtually alone, was warning that the point of no return had been passed, that such a large quantity of fissionable material had been produced on both sides of the Iron Curtain that no inspectorate, however great its theoretical powers, could ever be sure of tracing it all down and ascertaining that it was all being used for peaceful purposes. The margin of inevitable error might be moderate; but expressed as a percentage of a sizable stockpile it would represent an amount of fissionable material too large to be ruled out of consideration. A formidable amount of firepower—enough, as Churchill had said, to "give indisputable world domination to any great power which was the only one to have it"—could be hidden where no inspectorate could hope to find it.

This fact was of the utmost importance. It negated one of the two basic preconditions for disarmament in the midst of a cold war: the possibility of verifying the adversary's compliance. No rational governmental leader on either side of the Iron Curtain could now contemplate signing in good faith a treaty for the elimination of his country's nuclear weapons, intending to carry it out, whatever theoretical provisions for control might be written into the treaty. Even the possession of equally destructive (or, more destructive) bacterial and radiological weapons would not justify the sacrifice of an atomic stockpile, since such "Buck Rogers" weapons might not be adaptable to the same tactical purposes. Since there was no serious intention of eliminating nuclear weapons, it was dishonest, in point of fact, to go on proposing that a treaty for their elimination be drafted. But for a long time neither side had the courage to say so. Moch remained a voice crying in the wilderness.

A new approach clearly was called for. In December 1953 President Eisenhower suggested one such approach. Appearing before the UN General Assembly, he proposed a cooperative international effort in the field of atoms for peace, revolving around a pool or bank of nuclear fuel to be contributed by the "haves" and used primarily by the "have-nots." By-passed by the industrial revolution, the latter thus would benefit from its atomic counterpart in the twentieth century. In return, they would forswear atomic energy for war and accept UN inspection. Thus the spread of nuclear weapons would be discouraged.

The Communists' first reaction to the Eisenhower Plan was that the proposed International Atomic Energy Agency was just the Baruch Plan brought in by the back door; but they were forced by the enthusiasm for the plan among underdeveloped countries to reconsider this view and ultimately, within distinct limits, to cooperate. One by-product was a world-wide atoms-for-peace conference in 1955 at which much classified material was discovered to be in the possession of the enemy after all, and where as a result the wraps were taken off a great deal more, thus transforming the atmosphere in the peaceful atomic field. The International Atomic Energy Agency, established in 1956, has made a disappointingly slow start, its activities consisting primarily of atomic technical assistance. In part this has been because the pool or bank of fissionable material has not come into existence as such; the United States, Britain, and the Soviet Union have earmarked modest amounts of fuel which the agency may purchase and then sell, as a broker would do, but no attempt has been made to build an agency stockpile. The United States has preferred to conduct many of its atoms-for-peace programs on a bilateral basis outside the Agency, and this, too, has severely restricted the latter's scope of activity.

The Soviet Attitude after Stalin's Death

Simultaneously with the presentation and development of the Eisenhower Plan, a change took place in the face the Soviet Union turned to the Western world. The death of Stalin in 1953, combined with a number of other factors, produced a major Soviet "peace offensive" which began to sprout in the fall of 1954 and took tangible form on 10 May 1955 in the first Soviet disarmament plan considered by Western experts to be a serious effort at negotiation. It contained many objectionable features; but for the first time in any official disarmament proposal from either side of the curtain, it acknowledged the fact that nuclear stockpiles were now uncontrollable. "There are possibilities," it said, "beyond the reach of international control for circumventing this control and organizing the secret manufacture of atomic and hydrogen weapons, even if there is a formal agreement of international control."

Moscow did not draw the logical conclusion as a consequence and stop proposing the elimination of nuclear weapons; this step came, temporarily, the following year. What it did do was to downgrade the prohibition of *possession* (as distinct from the prohibition of *use*) to the later stages of the plan (where the West had previously put it). The Soviet Union also had what were, for it, some startlingly new things to say about inspection "on a permanent basis" with an inspectorate which, "within the bounds of the control functions they [the inspectors] exercise," would have "unhindered access at any time to all objects of control." This phraseology left important questions unanswered, but it was in striking contrast to anything the Soviet government under Stalin had been prepared to say.

Possibly the most interesting aspect of the 10 May plan, from the Western point of view, was what it proposed with respect to surprise attack. Because of the possibility that nuclear weapons could be made in secret, the world stood in danger of an atomic Pearl Harbor, Moscow said (though it did not use that precise metaphor). Logic, therefore, required measures to prevent surprise, the Russians said, proposing that inspectors be stationed at fixed ground posts where they could detect the large-scale preparations necessary for "sudden attack."

This approach to the disarmament problem—acknowledgment that atomic weapons could be secretly produced, and so were here to stay; and that consequently the most practical course was inspection so as to minimize the danger that they would be used—appealed to many in the West. The most likely, indeed, the most rational use of such weapons against a major nuclear power would be a massive effort to knock out the enemy's capacity for retaliation—an effort requiring preparation which could be detected. Inspection, therefore, could make major nuclear aggression impractical. Preliminary thinking along not dissimilar lines had been going on in the office of Presidential Disarmament Assistant Harold E. Stassen, who had been appointed in March 1955. It led the United States to say frankly and publicly, later that year, that it no longer favored the elimination of atomic weapons; that it wanted to focus on ways to make the balance of power more stable, with fewer temptations to rational war and much greater protection against disastrous accident. The "open skies plan" offered by President Eisenhower at the 1955 summit conference was one such plan. Later the President offered to combine it with the Soviet scheme for fixed ground observation posts, the whole to make up an early-warning system so effective that massive attack by surprise would be improbable and hence an unprofitable venture.

The Nuclear Stalemate

It is one of the anomalies of arms negotiation that with so much apparent agreement in principle, East and West have not yet, as of mid-1960, gotten down to a serious negotiation on ways and means. There was an attempt in 1958, but it broke down on what in retrospect seem ridiculous grounds: the United States insisted that the talks be purely technical, the Soviet Union wanted them purely political. No doubt a sounder reason was that comprehensive aerial inspection, as distinct from limited ground observation, would deprive the Soviets of the advantage in the field of military intelligence which they derive from the Iron Curtain. But this advantage is being greatly whittled down as the era of the reconnaissance satellite dawns; soon all skies will be open, within the technical capabilities of cameras in space vehicles. Moreover, the strategic damage the Soviet Union would sustain from the loss of its freedom to strike the first blow is being reduced to the vanishing point as atomic deterrents become harder and harder to knock out. Khrushchev is reported to have acknowledged in 1960 that a knockout blow against the enemy is now impossible.

Less ambitious plans have been offered from time to time to minimize the danger of surprise attack on a smaller scale or in a different form. Schemes for disengagement and/or denuclearization in Central Europe would serve this purpose, among others. But they have all foundered on political rocks. Some plans, for example, would freeze the partition of Germany, or place severe restrictions on the military potential of the Federal Republic, and hence would have been unacceptable to Bonn.

Much else could be done in many directions to help make the nuclear stalemate less precarious. Proposals to this end have been put forward by all the great powers. In March 1956 the United States offered one such plan, a scheme to keep additional countries from obtaining nuclear weapons (there were then only three members of the "nuclear club"). Reasoning that a proliferation of atomic weapons would sooner or later bring them into irresponsible hands and thus make the world a much more dangerous place in which to live, President Eisenhower proposed in a letter to Marshal Bulganin, then the Soviet Premier, that the production of weapons-grade fuel for atomic and hydrogen bombs be halted and that all future production be used for peaceful purposes. Strict international inspection would verify compliance—a task which probably could be performed with an acceptable margin of error.

In 1956 the United States could afford to stop bomb-fuel production far better than the Soviet Union could; its stockpiles, accumulated by then over a period of at least eleven years, presumably were larger by a considerable factor than those of the Soviet Union. And a "cut-off" would freeze the advantage. Realizing that this fact made the plan not only unacceptable to Moscow but unpersuasive to much of world opinion, the United States subsequently added a provision for the progressive reconversion of existing stockpiles to peaceful uses in amounts which could be larger for the United States than for the Soviet Union. Apparently Washington felt that the margin of error involved in determining the size of accumulated stockpiles would not be so great as to make invalid a ratio of transfers to peaceful uses based on the relationship between the size of the stockpiles. (If, for example, the United States had ten times as much fuel—so far as could be determined—its transfers would be ten times as large at each step.)

The real difficulty with the cut-off was that the permanent inspection necessary to verify compliance would make formidable inroads on national sovereignty and freedom of action. If it was to have maximum effectiveness, as the United States of course would want it to have, it would be comparable to inspection envisaged under the Baruch Plan (though of course the ownership, management, and enforcement provisions of the Baruch Plan, as distinct from its *inspection* provisions, would be irrelevant). This much inspection could have a major impact on the Soviet society and economy. Few Westerners genuinely expected the Soviet Union to accept the cut-off, despite benefits to Soviet as well as Western security in keeping nuclear weapons out of irresponsible hands. Indeed, the tactic of linking the cut-off to other disarmament measures came to be used as a protection against premature agreement on the other measures. During the period 1955-1959, for example, when Moscow was pressing for a test ban, the West contrived to avoid frontal opposition by linking the test ban, first to a package including the cut-off, and then to the cut-off alone. Only when the United States had completed its highest-priority testing and Britain had become a member of the "nuclear club" with full access to United States technology did Washington and London trade away the link to the cut-off for corresponding Soviet concessions at the three-power test-ban conference in Geneva. France, which wants to go on testing, continues to insist on the liaison; indeed, she has expanded the package to include steps which the West, as well as Moscow, can be counted on to resist.

The Test Ban

Prohibition of the testing of nuclear weapons is a measure designed tangentially to ease the "fifth" (or *n*th) country problem, that is, to help prevent the spread of nuclear-weapons technology. Few countries will invest the formidable amount of money and man-hours necessary to build a nuclear weapon if they may not legally test that weapon, once produced, and thus become thoroughly familiar with its performance. To bar testing, therefore, is to discourage the manufacture of the weapon. The prevention of radioactive contamination of the atmosphere is a second motive for the test ban, a more important one in some eyes. A formidable head of public steam has been built up on the subject in many parts of the world, despite official efforts to shunt it off—efforts which have included the establishment of a special United Nations Scientific Committee on the Effects of Atomic Radiation, which its sponsors mistakenly thought would deflate the dangers.

The test ban is unique in one respect: it is the one measure which at this writing has seemed genuinely negotiable between East and West. Soviet motives for seeking a test ban are generally supposed to include these: (a) desire for the propaganda advantage of successful advocacy (in point of fact, it was India which first proposed the test ban, but the Soviet Union quickly became its godparent); (b) concern over the spread of nuclear weapons to "fifth" countries, including notably Germany and quite possibly Red China—a China which, ten or twenty years hence, industrialized, with a population nearing 1,000,000,000 persons, might become less of an ally to the Soviet Union than a menace; (c) belief that the Soviet Union would be at an advantage in a weapons-technology race conducted wholly in the laboratory; and (d) desire for an East-West *détente* at minimum cost in terms of inspection behind the Iron Curtain.

The West too believes a test ban to be, on balance, in its interest. At least, dominant majorities in the American and British governments so believe, though there are powerful and influential dissenters. (The Russians have said privately at Geneva, "We have a lot of trouble with our military men, too.") The immense pressures of world opinion, reflected for example in repeated, overwhelming United Nations resolutions, have made the ban unacceptably costly for the West to resist, whether frontally or by more devious methods. There is concern over the fifth-country problem, including the problem of Red China. There is a desire to get the first olive out of the disarmament bottle. There is the possiblity that even the limited amount of inspection involved in a test ban would have beneficial effects on the Soviet system, impelling or hastening what George F. Kennan has called an "erosion from despotism." Whatever the governing motives, East and West have from time to time appeared to be coming together on the test ban. At this writing, its fate is in doubt, but despite setbacks to East-West rapprochement, hopes remain high.

Space Control and Missile Control

At the outset of this article, it was pointed out that the Western powers, against varying degrees of Soviet resistance, at first set out to eliminate atomic weapons, and then, when that step could no longer be adequately verified, have sought to limit the danger of their use—that is, to render the nuclear stalemate less unstable. Two methods of doing so have been mentioned: inspection to make surprise attack unprofitable, and curbs on the proliferation of nuclear weapons—the latter to be accomplished via a production "cut-off" or via a test ban. These approaches have by no means exhausted the list of possibilities.

The control of outer space, if effective, would put a kind of ceiling on the area in which warfare could be conducted. It would help minimize the danger of a push-button Pearl Harbor, deliberately planned and executed; it also would reduce the peril of accidental war. Such super-Damoclean threats as H-bombs in earth satellites, ready to be propelled downward on seconds' notice, would return to the realm of science fiction. Many persons, in and out of government, have therefore urged space controls. But they have run up against a virtually insuperable obstacle: effective space disarmament would upset the existing balance of East-West power. It would remove the "missile gap," the presumed Soviet advantage in the numbers, motive power, and sophistication of long-range missiles.

The West, in proposing such peripheral measures of space disarmament as the banning of bomb-carrying satellites, has reminded the Soviet Union that when the West had an advantage in nuclear weapons, it offered via the Baruch Plan to subordinate that advantage to the larger good of humanity. Moscow, however, has shown no inclination at all to take the hint. It has linked missile control to the prohibition of all means of delivering nuclear weapons to an enemy target, and has said that one part of the package must be the dismantling of "alien" bases on foreign soil. Moscow thus has proposed in effect that its temporary lead in space-weapon delivery systems be traded for permanent abandonment by the West of its globe-encircling base system. This deal has had no appeal for the West—even though, in the era of intercontinental and submarine-launched missiles, air bases are losing some of their strategic importance. Alliances are much less cohesive when not backed by a physical "presence"—and the United States will continue to want alliances in some parts of the world even when it can strike at the Soviet Union from its own soil. On the other hand, the desirability of clinging to Asian bases is being questioned by some in the wake of President Eisenhower's frustrated trip to Japan and his mixed welcome in Okinawa in June, 1960; some commentators are coming to regard the bases as counterproductive in the over-all cold-war struggle. Pentagon planners are reliably reported to be seeking out alternatives to peripheral military containment. However, the Soviet plan—destroying all means of weapon delivery—is regarded as too ambitious to be taken seriously, and present United States policy is still very much keyed to preserving the base system.

Neither the United States nor the Soviet Union appears to be genuinely eager for space control—the United States, because it wishes a free hand to close the missile gap, believing, perhaps too confidently, that time is on its side; the Soviet Union, because effective space control would deprive it of the advantage it now possesses.

If agreement is long delayed, the day may soon arrive when 100 percent effective missile control may become—like the verification of nuclear stockpiles—a technical impossibility. Indeed, there are some who contend that the point of no return has already been passed. It is by no means 100 percent certain that clandestine launching platforms in the Soviet Union, even those of fixed location, could all be found and hence outlawed or subjected to surveillance. The much greater problem of finding mobile platforms—which could be on submarines, railroad freight cars, even trailer trucks—is staggering. The practical effect of an attempt at prohibiting such platforms might be to make cheating immensely profitable. No one in the West has any doubt about who would be most likely to succumb to the temptation. Moreover, there is the added fact that such military uses of outer space as the reconnaissance satellite would benefit the West far more than the Soviet Union, since the West has much more to learn about the adversary's territory. For this reason, too, the West has been less than eager for early space disarmament. It has repeatedly proposed cooperation on space-for-peace, but not until March 1960 did it come up with anything more than first, tentative feelers toward the control of space-for-war. And that proposal—in the early stages, covering primarily the prohibition of bomb-carrying satellites—was such a fragmentary approach as to be widely classified as a headline-catching device.

An exception to this Western reluctance for space control has been France, which, beginning with the fall of 1959, has proposed extensive controls over space-weapon carriers; but there is more than a suspicion that General de Gaulle has been doing this in retaliation for American and British willingness to halt atomic tests. The Anglo-American stand on testing brings pressure on France to curb her nuclear-weapons technology at a time when the United States is unwilling to share the knowledge and equipment which would make French testing unnecessary.

The Control of Conventional Armaments

Finally, among the principal measures which could be taken to stabilize the nuclear stalemate, there is the limitation and control of manpower and conventional armaments. This has been a particularly controversial field, though overshadowed in urgency by the nuclear problem. A UN Commission for Conventional Armaments was set up in February 1947, parallel to the UN's Atomic Energy Commission. It had scarely begun to work (after delays over procedure and a lengthy debate on which should come first, disarmament or security

—the same issue on which the League of Nations became impaled) when in 1950 the Soviet Union staged a walkout over the issue of Chinese representation. The Korean war followed.

In February 1952, the General Assembly united the two arms commissions into a single UN Disarmament Commission competent to handle both atomic and conventional arms. On 28 May 1952, at one of the first meetings of the commission, the United States, Britain, and France laid before it for "illustrative purposes" manpower ceilings of 1,000,000 to 1,500,000 men for the Soviet Union, China, and the United States, and 700,000 to 800,000 for Britain and France. Other countries were to have armed forces numbering roughly one percent of the population. In June 1954, Britain and France (though not the United States) again proposed similar ceilings, reducing their own maximum to 650,000 men each. The proposal was one part of a carefully integrated, stage-by-stage plan for comprehensive disarmament.

The Soviet Union, for its part, repeatedly called in the years 1948-1955 for a one-third cut across the board in armed forces and armaments—a measure which, as the West pointed out time after time, would have kept intact the numerical superiority of the Red Army. Confidence that the Soviet Union would cling to that formula, and hence would go on rejecting numerical ceilings, may have tempted the West to offer lower force levels than it really wished to "live with." At any rate, it was a surprise to many when in May 1955 the Soviet Union adopted as its own proposal the force levels contained in the British-French memorandum of June 1954, with a minor variant applying to countries other than the Big Five. In this case, too, the proposal was part of a larger stage-by-stage plan.

In the summer of 1955 Harold E. Stassen "placed a reservation" on all United States disarmament proposals to date, in effect withdrawing them—a step which his aides said he later regretted, since it took such a long time to get new policy through the government machinery. One result was to pull back from the force-level ceilings. In March 1956, Mr. Stassen offered a "first-stage" plan which included new figures of 2,500,000 men for the United States and the Soviet Union and 750,000 for Britain and France. In the meantime, the Pentagon had privately pointed out that a cut below that level would require the abandonment of some (or, if a severe cut, all) of the United States' overseas bases, including those which were the backbone of NATO. The Soviet Union had apparently perceived this fact earlier, and like a jiu-jitsu fighter had used the adversary's thrust to help throw him off balance.

When Moscow felt it had gained as much propaganda advantage as it could by deriding the American shift, it accepted the 2,500,000 figure also. But there was a difference of view as to whether other steps should be taken in conjunction with force-level cuts, and if so, what they should be. Soon both sides began a unilateral reduction of their armed forces, which, if Soviet statements are to be accepted at face value, will bring both sides down roughly to the "first-stage" level they were (and still are, as of 1960) seeking to negotiate. Had the West been willing to isolate force levels from other aspects of disarmament, it might have been able to extract a useful price from the Soviet Union, in terms of inspection, for the reduction which was in fact made. But instead the cut was made voluntarily, in large part, apparently, to balance the American budget. If this reduction was regarded by the Soviet Union as a contribution to its security and budgetary stability, as Soviet diplomacy implied, Moscow got it for nothing. Moreover, the Soviet Union, benefiting from less intense American competition and therefore feeling more free to cut its forces, trumpeted to the world those cuts, claiming to have initiated the idea, and reaping a propaganda harvest; whereas the United States, perhaps for domestic political reasons, sought to minimize the significance of what it had done.

In any event, many have felt there was a large element of unrealism in talk of force-level cuts, whether supervised by an inspectorate or not. Manpower, once trained, is of military use, whether in uniform or civilian clothes; a man in the reserves is obviously subject to quick call while he remains in good physical condition. Moreover, how would an inspectorate go about verifying, with 100 percent certainty, the number of men under arms? Would it not be possible temporarily to "demobilize" a certain number of men while a census was being taken? One of the best methods of checking, it is said, is to take inventory of supplies, including perishable food stuffs. But this suggestion evokes the image of international inspectors going through quartermaster warehouses counting every orange, banana, and potato —a formidable task, to say the least. Other methods, including cost accounting and budget checks, are not infallible. The latest United States proposals with respect to manpower, put forward in 1960, rely upon spot checks at unexpected places and times.

Similar difficulties are encountered when one sets out to reduce conventional armaments, under adequate inspection. It is obviously not feasible to inventory every grenade, mortar shell, and bullet in a country the size of the Soviet Union or the United States. Unless every factory—literally every factory in the country, of whatever size

—were to be put under surveillance to make certain it did not convert to war, there could be no certainty that weapons, once destroyed, were not replaced. In 1955 Stassen proposed an approach to conventional weapons which circumvented some of the problems involved: internationally-controlled supply dumps, within national territory, where a government would put some of its weapons into cold storage, as it were. The proposal figured again in the Western disarmament plan offered in March 1960. If the number of weapons stored were substantial, their replacement would be so costly as to defeat one of the presumed purposes of entering into the disarmament treaty. Meanwhile they would be available for use if a crisis made it necessary to denounce the treaty.

In one respect, force-level cuts and arms reductions have become more difficult since 1954 because France has been embroiled in Algeria and hence has needed its military strength. No mention was made of force levels for Britain and France in the West's 1960 plan, though it reaffirmed 2,500,000 men as the initial level for the United States and the Soviet Union. When and if the time comes that the problem is no longer academic, the West will also have to decide how to approach Red China to seek its acquiescence in a disarmament agreement. Would the United States be prepared to recognize the Peiping regime—the minimum price that Peiping could be expected to demand for participation? Already this problem is becoming pressing in the area of a test ban.

The Geneva Conference of 1960

Disarmament is an almost unending series of difficult, seemingly unanswerable, questions. There is great temptation for the skeptic to throw up his hands. Soviet Premier Khrushchev gave the skeptics considerable grist when he appeared before the UN General Assembly in September 1959 and (reviving the Litvinov thesis of 1917) proposed "general and complete disarmament." The West regarded this as an outrageously hypocritical travesty on sense and logic, but Western diplomats felt obliged to pretend to take it seriously lest they be maneuvered into an unenviable position before world opinion.

Anticipating Khrushchev's move, Britain had offered its own comprehensive disarmament plan twenty-four hours earlier; and at the Geneva disarmament conference of 1960, the five Western powers (the United States, Britain, France, Canada, and Italy) joined in sponsoring a similar proposal. They then tried to persuade the Soviets to discuss some one concrete aspect of the plan, offering first one approach, then another. But Soviet delegate Valerian Zorin continued to ride his premier's white horse of general and complete disarmament. Each time the West thought he might have finished the exercise, he would dig in the spurs once again and go galloping down Geneva's Avenue de la Paix, heraldic flags flying. Only if the West would take full responsibility for abandoning total disarmament would he join in discussing partial measures, he said; and this the West would not do. On 2 June, Zorin mapped in greater detail the road to the goal, making route changes which some, at least, in the West considered improvements. He offered to begin, for example, by dealing with the means of delivering nuclear weapons; and he mentioned the nuclear-production cut-off as one subject that might profitably be given early "joint study." The plan also contained somewhat more realistic-sounding passages about control. But the objective remained the same: total disarmament, beginning with total destruction of delivery systems (including overseas bases); and this atrophied the negotiations from the beginning. The West felt obliged to profess the same desire; it even stole the copyright on the Khrushchevian phrase "general and complete disarmament" and made it a part of the West's "ultimate goal." But few believed privately that this was, in fact, the objective of either party, and so the negotiations wandered in a maze of unrealism until, on 27 June, they broke up in a Soviet-bloc walkout.

Perhaps if the West had offered a more tempting alternative to general and complete disarmament, Zorin might more quickly have given up his three-ring horsemanship. But the Western plan—both in its original form on 16 March and in a slightly revised version presented 27 June—was a conglomeration of fragments, representing the lowest common denominator on which the Western capitals could agree. Among the very first steps would be the establishment of a control organ—a time sequence which, whatever its logical justification, is to the Soviet Union like waving a red flag in front of a bull. "Control without disarmament" has always meant espionage to the Kremlin because of the Soviet mania for secrecy. In the wake of the U-2 incident, which Khrushchev used to torpedo the May 1960 summit conference, anything resembling information-gathering provoked even more frenetic outbursts in Moscow.

One striking element in the Western plan, as presented 16 March, was the linkage of ultimate total disarmament to the "establishment" of an "international organization to preserve world peace." The implication that the UN is not now such an organization, or at least is one only in embryo, and that therefore one must be "established" *de novo,* irritated supporters of the UN and evoked a protest from Secretary-General Dag Hammarskjöld. Chapter VII of the Charter, Hammarskjöld pointed out, blueprinted a peace-keeping world police force; if the great powers could agree on building one outside the UN, they could at least equally easily agree on reactivating Chapter VII. If they wish to bypass the veto and are agreed on so doing, let them amend the Charter, he said; if they are not agreed, the veto reflects the facts of international life and cannot be bypassed. In the revised version presented 27 June, the West corrected this defect; the new plan specified that the "peace force" would be "within the United Nations." On 2 June, the Soviet Union had envisaged reactivation of the Chapter VII police force, though at a later stage in the disarmament conference. On paper, therefore, there was considerable agreement on this point.

Advocates of world government have been pleased that the idea of organized force to keep a disarmed peace should be a part of official Soviet and Western policy. However, just how an international police force could today deal with a world in which hidden stockpiles of nuclear weapons in formidable quantities might be in the hands of a peacebreaker is not clear. Nor is it clear, despite lip service from the West to "general and complete disarmament," and despite a phrase in the plan about the "final elimination" of weapons for mass destruction, what the West is in fact proposing with respect to such weapons. The Western plan is careful to predicate that "all measures of disarmament must be observed and verified by an appropriate international organization." This leaves in a shadowy zone the measures of disarmament which are listed as objectives but which could not be observed and verified.

Perhaps it is not surprising, therefore, if we consider the positions taken on both sides, that disarmament negotiations in the spring of 1960 bogged down in empty propaganda haggling. The Soviet historian, E. V. Tarlé, has written,

> The idea of disarmament has been one of the most favored forms of diplomatic dissimulation of the true motives and plans of those governments which have been seized by a sudden "love of peace." This phenomenon is very understandable. Any proposal for the reduction of armaments could invariably count upon broad popularity and support from public opinion.

The public has become somewhat more sophisticated since Tarlé's time (the period between the two world wars), but large sections of it are still prepared to swallow outrageous propositions.

Diplomats, therefore, go on seeking needles of serious intent amongst haystacks of propaganda. The very process of confrontation and maneuver sometimes is considered beneficial. And the alternative, as President Eisenhower has put it, is that the "two atomic colossi" should be "doomed malevolently to eye each other indefinitely across a trembling world."

HERMAN KAHN

The Arms Race and Some of Its Hazards

Preface

IT IS EASY TO WRITE GRAPHICALLY and persuasively of the dangers of the arms race, nuclear and otherwise.[1] Such documents are often well received: the author's heart seems to be in the right place; he is for people and against the abominations science and technology have produced. Yet, this question remains unanswered: Why do nations in general, our own in particular, continue to play such a dangerous and pointless game?

Here we hit on the nub of the matter: the game is indeed dangerous, but not pointless, since not to play it (even to reduce forces or submit to arms control) can also be dangerous: a Pearl Harbor or a Munich is all too possible. If we examine the whole range of possibilities, beginning with unilateral disarmament, surrender, appeasement, or accommodation, and ending with an accelerated arms race, preventive war, Suicide Pacts, and Doomsday Machines, we discover that there are no pleasant, safe, or even unambiguously moral positions for the individual, for a nation, or for civilization. Unfortunately, the discussions that concentrate on one facet of our dangerous future tend to create a psychological atmosphere conducive to the neglect of the remaining problems of security. This is no reason, however, for not discussing the dangers of the arms race (or any other dangers), but only for emphasizing the ultimate need for a balanced comparison of all the dangers.

Elsewhere I have written on why we may need military establishments of a much higher quality than is usually conceded, even by people who think of themselves as "militarists,"[2] and on some of the difficulties and dangers of arms control.[3] While both these papers make the point that arms control (both implicit and explicit, unilateral and multilateral) is necessary if we are to survive until 1975 and later years without a major catastrophe, the first paper in particular argues for increased arms in certain areas. I will not summarize the arguments here. This is a difficult, unpleasant, and emotional subject, the points raised are often irritating or dismaying, and many readers transfer their irritation and dismay to the author. For example, if one presents a sober account of the risks an attacker might face from a retaliatory blow, it is easy to show that, subject to some chilling uncertainties, there are many circumstances in which the risks the attacker faces are considerably less than is generally believed. As a result, there are plausible situations in which a perfectly sane (but calculating, decisive, or ruthless) attacker might decide that "it is less risky to go to war than to live with the current situation or crisis." At this point, many readers conclude that the analyst is advocating preventive war; in other words, instead of examining the arithmetic, they conclude that anyone who calculates this way might too easily act this way.

While the most important problems of the 1960's and 1970's may result from the arms race itself, rather than from the political and military dangers against which the arms race is supposed to protect us, those dangers exist. Today they are manageable only because the arms protect us from them. Let us now look at these arms.

Some Hypothetical Ultimates

Let us begin with some comments on the strategic theory of three conceptualized devices, which I shall call respectively the Doomsday Machine, the Doomsday-in-a-Hurry Machine, and the Suicide Pact Machine. To discuss these hypothetical (almost caricatured) devices will not only focus attention on the most spectacular and ominous possibilities of the arms race, but it will also clarify a good deal of our current strategic thinking.

The Doomsday Machine. A Doomsday Weapon System might hypothetically be described as follows: let us assume that for 10 billion dollars one could build a device whose function is to destroy the earth.[4] This device is protected from enemy action (perhaps by being situated thousands of feet underground) and then connected to a computer, in turn connected to thousands of sensory devices all over the United States. The computer would be programed so that if, say, five nuclear bombs exploded over the United States, the device would be triggered and the earth destroyed. Barring such things as coding errors (an important technical consideration), this machine would seem to be the "ideal" Type I Deterrent.* If Khrushchev ordered an attack, both Khrushchev and the Soviet population would be automatically and efficiently annihilated. (The emphasis is deliberate: in most cases, deterrents destroy populations—not the decision makers.)

Even if this is the ultimate in Type I Deterrence, the Doomsday Machine is an unsatisfactory basis for a weapon system. It is most improbable that either the Soviet Union or the United States would ever authorize procuring such a machine. The project is expensive enough so that it would be subjected to a searching budgetary and operational scrutiny, one which would raise questions the project could never survive.

The Doomsday-in-a-Hurry Machine. Before considering these questions, let us consider how one might adapt the Doomsday Machine to purposes of Type II and Type III Deterrence. For reasons that will become clear, let us call this model the Doomsday-in-a-Hurry Machine. The computer would be given all the facilities it needed to be "well informed" about world affairs. We could then unilaterally legislate into existence a "Soviet Criminal Code." This would list in great detail all the acts which the Soviets were not allowed to commit. The Soviets would then be informed that if the computer detects them in any violations it will blow up the world. The logicians (and some so-called practical men) might then believe that we had solved all our deterrence problems. After all, we would then have drawn a line the Soviets would not dare to cross. We could relax forever our interest in defense and turn our attention to other matters.

Unfortunately, the world is not that simple. First, the Soviets would rush to build their own machine. There would be a race to publish first. This race to publish first involves more than prestige. There is almost a certainty of an incompatibility between the two sets of rules, since Paragraph 1 of each probably states that the opponent shall not build a Doomsday Machine! To many people, to build a

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* As in my forthcoming book[1] and the RAND Paper P-1888-RC,[2] I would like to distinguish three kinds of deterrence. Type I Deterrence is deterrence of an "all-out" direct attack. Type II Deterrence is defined as using strategic threats to deter an enemy from engaging in very provocative acts other than an all-out attack on the nation using the deterrence. Type III Deterrence might be called a graduated or controlled deterrence: it refers to situations in which an act is deterred because the potential aggressor is afraid that the defender or others will then take limited actions, military or nonmilitary, which will make the aggression unprofitable.

Doomsday Machine would be the greatest provocation short of an attack that the opponent could commit. In fact, because it may destroy so many people, some find it more provocative than an attack. Even if we succeed in publishing first, and even if the Soviets believe our machine will work as advertised, and are deterred from publishing, trouble is still almost certain. It will simply prove impossible to draw a useful, unambiguous line that covers most Type III Deterrence situations—it may even be difficult to cover unambiguously all possible Type I and Type II situations. The first time there is a difference in interpretation the world would be blown up.

The Unacceptability of Doomsday Machines. Let us examine the use of both the Doomsday and Doomsday-in-a-Hurry Machines as deterrents. It is desirable that a deterrent should be: frightening; inexorable; persuasive; cheap; nonaccident prone—and *controllable.*

As for the first five characteristics, both Doomsday Machines are likely to be better than any current or proposed competitor for deterrence. They are as *frightening* as anything that can be devised. They are more *inexorable,* since they can be made almost invulnerable to direct physical destruction (electromagnetic waves which would set them off go faster than shock waves which might destroy the device); the operation is in principle so simple and reliable that one can really believe it would work (as opposed to a complex weapon system which requires the split-second coordination and almost perfect operation of many complex parts in a strange post-attack environment); and the automatic operation eliminates the human element—including any possible loss of resolve as a result of either humanitarian consideration or threats by the enemy.

The machines are certainly *persuasive.* Even the most simple minded should be able to understand their capabilities. Most likely such machines would be *cheap,* compared to present weapons expenditures.

Finally, they are relatively *foolproof,* in the sense that the probability of an accidental or unauthorized triggering should be low. This means, while the possibility of an unauthorized or accidental use of the machine, in spite of all precautions, would be too high to be acceptable, it would still be lower than the probability of such an action in complicated and dispersed systems such as Polaris, Minuteman, and airborne alert, etc. Not only are the number of buttons very low, but the Doomsday weapon system is so simple that one should be able to see clearly the places where trouble could occur, and then take all possible precautions.

The difficulties lie in the fact that the Doomsday Machine is not sufficiently controllable. Even though it maximizes the probability that deterrence will work (including minimizing the probability of accidents or miscalculations), it is totally unsatisfactory, for one must still examine the consequences of a failure. A failure will kill too many people, and kill them too automatically. There is no chance *of human intervention, control, and final decision.* Even if we give up the computer and make the Doomsday Machine reliably controllable by the decision makers, it is still not controllable enough. Neither NATO nor the United States, possibly not even the Soviet Union, would be willing to spend billions of dollars to give a few individuals this particular kind of life-and-death power over the entire world.

If one were presenting a military briefing advocating some special weapons systems as a deterrent and examined only the first five qualities on the list, the Doomsday Machine might seem better than any alternative system; nevertheless, it is unacceptable. This may imply that either some of the weapon systems currently being proposed are also unacceptable, or that the way we talk about these weapon systems is wrong—very likely both.[5] Most decision makers, if forced to choose between accommodation to the point of surrender, a large risk of surprise attack, or buying a Doomsday Machine, would choose one of the first two as against the last one.

This last statement may surprise many who feel that irresponsible decision makers on both sides have already bought the equivalent of Doomsday Machines, almost without a second thought. I used to be wary myself of discussing the concept for fear that some overenthusiastic colonel would issue a General Operating Requirement or Development Planning Objective for the device. For whatever it is worth, my experience in two years of briefings has been exactly the opposite. Except for some intellectuals, especially certain scientists and engineers (a curious exception that may reflect some inadequacies in technical education) who have overemphasized the single objective of maximizing the effectiveness of deterrence, the device is universally rejected. It just does not look professional to senior military officers (in a way it threatens them with a fourth service), and it looks even worse to senior civilians. The fact that more than a few scientists and engineers do seem attracted to the device is disquieting, but as long as the development project is expensive, even these dedicated experts are unlikely to get one under way.

A Fundamental Problem. The concept of the Doomsday Machine raises certain awkward questions which must be considered by both policy maker and technician. If it is not acceptable to risk the lives of the *three billion* inhabitants of the earth in order to protect ourselves from surprise attack, then *how many people would we be willing to risk*? It is clear that both the United States and NATO would reluctantly envisage the possibility of one or two hundred million fatalities (i.e., about five times more than those in World War II) from the immediate effects, even if one does not include long-term effects due to radiation, if an all-out thermonuclear war results from a failure of Type I Deterrence. Under somewhat more controversy, similar numbers would apply to Type II Deterrence.* We are willing to live with the possibility partly because we think of it only as a remote possibility. We do not expect either kind of deterrence to fail, and we do not expect the results to be that cataclysmic if deterrence does fail. However, even those who expect deterrence to work might hesitate at introducing a new weapon system that increased the reliability of deterrence, but at the cost of increasing the possible casualties by a factor of ten, so that there would then be one or two billion hostages at risk if their expectations fail.

Neither the 180,000,000 Americans nor the half billion people in the NATO alliance would be willing to procure a security system in which a malfunction could cause the death of one or two billion people. If the choice were made explicit, then the United States or NATO would seriously consider "lower quality" systems, i.e., systems which were less deterring, but whose consequences were less catastrophic if deterrence failed. They would even consider such possibilities as a dangerous degree of unilateral disarmament, if there were no other acceptable postures. The West might be willing to procure a military system which could cause such damage if used in a totally irrational and unrealistic way, but only if all of the plausible ways of operating the system would not inflict anything like the hypothesized damage. Nor would we knowingly build a strategic system which forced the Soviets to build a Doomsday Machine in self defense. On the other hand, we would probably be willing ourselves to go to desperate measures rather than give in to a cynical attempt by the Soviets to blackmail us by building or threatening to build a Doomsday Machine.

Possible Future Problems. Aside from moral and political reasons, and aside from the repugnance policy makers and practical men feel for a device that is poised to strike at their own population, the main reason the Soviet Union and the United States would not build a

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* For example, Brennan would concede the statement for his B deterrence but not his C deterrence. [Primarily because I believe we have the capacity to deal with failures of Type C deterrence by drastically less expensive methods. —Ed.]

Doomsday Machine is that they are both *status quo* powers; the United States is one because it has so much, and the Soviet Union is one partly because it also has much and partly because it expects to get so much more without running any excessive risks. However, even if we believe that neither the Soviets, nor the Americans, nor other technically competent and wealthy but "satisfied" powers (such as England) would deliberately build a Doomsday weapon system, at least three important problems arise. Would a nation build one inadvertently? If not now, will it change its mind in the future? Would a determined non-*status quo* nation build one?

I do not believe that any nation will build a Doomsday Machine inadvertently, partly because it is so hard to build one, but mostly because current discussion is focusing attention on this problem, and decision makers are becoming conscious of its implications. As for a technically advanced *status quo* country's changing its mind, I could easily imagine a crisis in which a nation might desperately wish it had procured such a machine. Fortunately, it seems less likely that a nation would procure a standby capability that could be connected up at the last moment than that it would procure a continuous capability in being. The lead time for designing and constructing such a machine would be so long that the crisis would be settled before the project could get under way. In the long run (one to three decades), the third question, "Would a determined non-*status quo* nation build one?" may turn out to be the most important.

Many scientists believe that Doomsday Machines will inevitably become both clearly feasible and much cheaper than I have suggested, so that the developmental gamble will be much less risky than it is today. In addition, a number of powers which, unlike the United States and the Soviet Union, may not be so cautious in outlook, will be getting both richer and more competent technically, yet may retain their non-*status quo* outlook. For example, there may be a nation (like the Germany of 1933) which is wealthy enough and technically competent enough to have an advanced military technology, yet desperate or ambitious enough to gamble all.[6] Or some of the underdeveloped nations may become rich in terms of gross national product, but have such a low per capita income or other social anomaly that they retain attitudes more appropriate to a desperate claimant on the world's resources than a responsible "bourgeois" member of international society.

China presents the outstanding possibility of this last type in the next decade or two. Such a third nation might well decide that an investment in a very high-quality Type I Deterrent would pay dividends. It is unlikely (though not impossible) that the leaders of that nation would plan on threatening the world with annihilation or extreme damage unless given their way. If they can do the damage gradually, they can make the threat clear and demonstrate their resolve, without actually committing suicide. As an example, suppose that the blackmailing nation started a process which it could reverse, but which could not be reversed or negated by others, in which the temperature of the earth was artificially dropped five degrees a year. If they also had a Doomsday Machine to protect themselves from attack (one which might depend on the same mechanism), one could easily imagine that they could demonstrate enough resolve to bring most of the other major nations to terms. A much more likely possibility for the possessor of a Doomsday Machine would be to exploit the sanctuary afforded by his "excellent" Type I Deterrent to be as aggressive as he pleased against his neighbors and to threaten any who interfered with all kinds of punishment—for example, some form of controlled nuclear retaliation, in which he destroyed two or three of the major cities of his interfering opponent. Even if it were feasible to retaliate in kind without setting off the Doomsday Machine, the social and political impact of accepting such losses would raise much more serious internal and external problems in the United States than in China. It seems most likely, for example, that having to accept and explain the rationale of an exchange of two or three major United States cities for an equal number of Chinese cities would result in political suicide for the party in power in the United States, as well as in some instabilities in our alliances, but only in some serious inconvenience to the Chinese government. It should therefore be a major objective of arms control to prevent such hypothetical, but not unimaginable, problems from occurring. (Here is one clear case of joint Soviet-United States interest.)

The Suicide Pact Machine. There is another form of deterrence which, while not a Doomsday Machine, is still an "ultimate" of a sort. This could be called the Suicide Pact Machine, an attempt to make the failure of Type I Deterrence mean automatic mutual homicide. The adherents to this somewhat more practical device hope to divide the work of deterrence in a natural way—we poised to destroy the enemy and the enemy poised to destroy us, and neither of us buying any effective active or passive defenses for our respective societies.[7] The Suicide Pact Machine is clearly more satisfactory to both humanitarians and neutrals than the Doomsday Machine, and both should note the distinction. As far as patriots and nationalists are concerned, I believe that the Suicide Pact systems have many of the same drawbacks as the Doomsday Machine, though not in so extreme a form. The major advantage of the Suicide Pact is that one is not in the bizarre situation of being killed with one's own equipment; while intellectuals may not so distinguish, the policy makers and practical men speak as if they would prefer being killed by the other side rather than their own.

It is just because this view no longer strikes some people as bizarre that it is so dangerous. The Suicide Pact used to be, albeit only half-intentionally so, NATO policy and recently has come extremely close to being consciously adopted as official United States policy. It is not known to what extent the Soviets are planning to live up to "their part of the bargain" and move in the same direction. While Khrushchev's speech of 14 January 1960 indicated that Soviet decision makers have begun to accept some of the concepts of deterrence which have so persuasively swept the West since the mid-fifties, there is no indication that this acceptance will lead to a relaxation of current Soviet attempts to attain a capability of fighting and surviving wars as well as of deterring them. The opposite may be true. The main point of the speech was not that the Soviets were disarming, but rather that, by cutting back on conventional capabilities, they would gain in their capability to fight a modern thermonuclear war. Whether this is the somewhat misleading "more bang for the buck" program we once followed or a serious attempt to be prepared for any eventuality, only time or Khrushchev can tell.

Various Ways in Which War Can Start

Up to this point, we have discussed only in the most peripheral way the major risk of the arms race—war itself. As regards arms control, there are three major programs that could diminish the risk of such a possibility:

1. Arms control can reduce the probability of events, both international (tensions and crises) and technical (false alarms and misunderstandings), that could give rise to war.
2. Arms control can also help reduce the probability that an event of the kind that causes war will actually result in war.
3. Arms control can reduce the damage of an actual war, not only by abolishing the use of certain weapons and controlling the use of others, but also by facilitating ahead of time the machinery by which wars are ended before they become overwhelmingly destructive.

There is no space here to expand these possibilities; they are all discussed elsewhere in this issue. However, it may be well now to discuss systematically how a war could arise and indicate at least some of the problems to be considered. Let us begin by listing a number of possibilities, in a semi-technical jargon intended to categorize and describe them:

1. *Accidental war* (false alarms, self-fulfilling prophecy, unauthorized behavior, true mechanical or human error).
2. *Rationality of Irrationality* (the game of "Chicken," Type II Deterrence situations).
3. *Calculation* (Type II Deterrence situation; preventive war; pre-emptive war; world domination; other kinds).
4. *Escalation.*
5. *Catalytic war* (ambitious third nation; desperate third nation).

The items in these five categories are neither exhaustive nor distinct from one another. They are not exhaustive because our weapon systems are so new, and their impact, both on one another and on international relations, is so little known that it would not be surprising if a war started in some manner not heretofore thought of. However, I have made the list as exhaustive as possible, and in doing so it has been convenient to list categories that occasionally overlap. This is probably better than to strain too much to prevent duplication or leave out some important possibility. The five major causes represent roughly the writer's personal estimate of the order of probability.

The first possibilty is a war by *accident.* One sees many statements to the effect that a flock of geese flying through an early warning radar line might be mistaken for a flight of bombers, or that a meteorite could be mistaken for an ICBM, and thus touch off a retaliatory strike by mistake. Unless one side or the other is careless enough to install a quick reacting, non-recallable strategic system, it is most unlikely that such an event would trigger off a retaliation. It is just because radars do indeed occasionally give false alarms that it is essential for both sides to install reaction systems that either have so-called "fail safe" or "positive control" features built into them, or that can accept the enemy's attack and still strike back effectively. Such systems may use an ambiguous radar warning so as to take some temporizing measure that will reduce vulnerability to enemy attack and also provide a better position from which to retaliate. But the commander must wait for further confirmation before making any irrevocable commitments.

There is a danger that the temporizing measures that are instituted on an ambiguous warning will remove some of the psychological, legal, and physical safeties that normally govern the strategic force, so that there is a greater load thrown on the remaining safeguards. Actually, the greatest danger is the possibility that a chain of self-fulfilling prophecies is set into motion. It is perfectly conceivable for one side's temporizing action to be observed by the other side, to be misinterpreted as being aggressive rather than defensive, thus causing the other side also to make some temporizing defensive move. This second defensive move could in turn be misread by the side originally alerted as confirming his suspicions, so he may make some further moves. It is then possible for reactions and signals to be set into motion which trigger off further reactions and signals by both sides until a point of no return is reached. This is one reason that it is necessary for each side not only to be cautious and responsible, but also to make sure that the other side also understands what is happening. In so far as any temporizing measures depend on doing things which raise apprehensions on the other side, it is important to be prepared to allay those apprehensions. This is probably a very fruitful area for arms control.

The Soviets are completely aware of the problem. For example, in a Security Council debate of 21 April 1958, Arkady S. Sobolev made the following statement[8]:

> American generals refer to the fact that up to the present time the American planes have taken off on their flights and returned to their bases as soon as it became clear that it was a case of false alarm. But what would happen if American military personnel observing their radar screens are not able in time to determine that a flying meteor is not a guided missile and that a flight of geese is not a flight of bombers? Then the American planes will continue their flight and will approach the borders of the Soviet Union.
>
> But in such a case the need to insure the security of the Soviet people would require the USSR to make immediate retaliatory measures to eliminate the oncoming threat. The Soviet Government would like to hope that matters will not go so far.
>
> In order to get a clearer idea of the extremely dangerous character of acts of the United States [that are] dangerous to peace, it is enough to ask the question what would happen if the military Air Force of the Soviet Union began to act in the same way as the American Air Force is now acting? After all, Soviet radar screens also show from time to time blips which are caused by the flight of meteors or electronic interference. If in such cases Soviet aircraft also flew out carrying atom and hydrogen bombs in the direction of the United States and its bases in other states, what situation would arise?
>
> The air fleets of both sides, having observed each other, having discerned each other somewhere over the Arctic wastes or in some other place, apparently would draw the conclusion natural under those circum-

stances, that a real enemy attack was taking place. Then the world would inevitably be plunged into the hurricane of atomic war.

In spite of their awareness of the problem, the Soviets have tended to emphasize disarmament almost, but not quite, to the exclusion of other aspects of arms control. For example, at the 1958 Surprise Attack Conference, they stressed larger issues and refused to discuss narrow technical issues although our own position may have been excessively narrow. To this writer it seems dangerous to wait for a settlement of the political issues before considering this problem, but in this kind of a problem it takes two to make an agreement. However, even informal implicit agreements or, on some aspects, unilateral concessions can be helpful.

There is also the possibility that some pathological or irresponsible person will deliberately try to start a war or crisis. The Soviets have made much of the possibility that a deranged or irresponsible American pilot on airborne alert would take it into his head to attack Russia alone. Not only are there many safeguards against this, but it is most unlikely that a single plane attack would touch off a war. A much more ominous possibility is given in the book *Red Alert*,[9] in which a determined SAC general, who, unknown to his superiors, is sick with an incurable ailment (and whose judgment and sense of discipline are thus affected), decides personally to end the Soviet problem once and for all. The most interesting part is the clever way he gets around the rather elaborate system set up to prevent exactly this kind of behavior. And last, there is always the possibility of a genuine accident—a switch failing, some ICBM's being launched through some mechanical or human error, some stockpile weapons being accidentally exploded—setting off a disastrous series of actions and counteractions.

I consider all the above "accidents" improbable. The reason why I put accidental war at the top of the list is not because the probability is high, but because (assuming, perhaps optimistically, that both sides are careful, competent, and responsible) the other ways in which a war could occur have an even lower probability. It is also clear that many of the methods recommended to reduce the probability of war by accident might very well result in increasing the likelihood of war from one of the other four causes. After both these points are made, it must also be mentioned that nobody can estimate realistically what the probability of accidental war is. While it would be hard to convince me that it is more than, say, 1 in 10 a year, still, if it were this high, the situation would be entirely unsatisfactory.

Even if it were 1 in 100 a year, it would still be unsatisfactory, because the current state of affairs could not be allowed to continue indefinitely. One must eventually introduce a major change in the situation, or expect to get into a war anyway.

The Rationality of Irrationality. The next possibility for war stems from the use of the rationality of irrationality, or commitment strategies. In any bargaining situation, it can make sense to commit oneself irrevocably to do something in a certain eventuality, and at the same time it may not make sense to carry out the commitment if the eventuality occurs. A graphic example is given by Bertrand Russell[10]:

> This sport is called "Chicken!" It is played by choosing a long straight road with a white line down the middle and starting two very fast cars towards each other from opposite ends. Each car is expected to keep the wheels of one side on the white line. As they approach each other mutual destruction becomes more and more imminent. If one of them swerves from the white line before the other, the other, as he passes, shouts "Chicken!" and the one who has swerved becomes an object of contempt.

It is clear that if one side really wishes to win this game its best (rational) strategy is to commit itself irrevocably to going ahead. If one can convince the other side that one has done this, then the other side must back down. However, if the other side still refuses to back down after the irrevocable commitment has been made, it would be irrational to carry out the rationally made commitment. Since both sides will be attempting to use this strategy, it is also quite clear that the game may end in a disaster.

According to Bertrand Russell, the above game is played by degenerates in America and nations everywhere. The caricature arises, because Russell ignores the fact that it is a major purpose of diplomacy to prevent a crisis from arising which can only be settled by the total and humiliating defeat of one side or the other. Most bargaining situations involve gains for both sides, and the major question is on the division of these gains and not the humiliation of the other side. However, the game of chicken may occur. Barring enforceable adjudication, the less one is willing to play the game, the more likely it may be that one may end up having to play it. Life, liberty, and security may depend on being willing to play this dangerous game. As Russell states:

> Practical politicians may admit all this, but they argue that there is no alternative. If one side is unwilling to risk global war, while the other side is willing to risk it, the side which is willing to run the risk will be victorious in all negotiations and will ultimately reduce the other side to

complete impotence. "Perhaps"—so the practical politician will argue—"it might be ideally wise for the sane party to yield to the insane party in view of the dreadful nature of the alternative, but, whether wise or not, no proud nation will long acquiesce in such an ignominious role. We are, therefore, faced, quite inevitably, with the choice between brinkmanship and surrender."

The rationality of irrationality war should be distinguished from the situation in which both sides have incompatible objectives which they are determined to achieve, no matter what the risks: in this case war must result. The rationality of irrationality war corresponds to a situation in which neither side really believes the issue is big enough to go to war over, but both sides are willing to use some partial or total strategy of commitment to force the other side to back down. As a result, they may end up in a war they would not have gone into, if either side had realized ahead of time that the other side would not back down, even under pressure.

A typical circumstance in which such a situation could arise results from the use of Type II Deterrence. Imagine, for example, that the Soviets had done some very provocative thing, such as invading Western Europe with conventional armies, on such a large scale that we felt that we could not stop the invasion by any limited actions, and that we would not be able to rescue Europe at a later date. We might still not be willing to strike the Soviets with our SAC, in view of the terrible price we would have to pay to their retaliatory blow, even if we struck them first. However, we could evacuate our cities and place our forces on a super-alert status, and thus put ourselves in a much better position to strike first and accept the retaliatory blow. We might then present the Soviets with an ultimatum. We would in effect be presenting the Russians with the following three alternatives: to initiate some kind of strike; to prolong the crisis, even though it would then be very credible that we would strike if they continued to provoke us; or to back down or compromise the crisis satisfactorily. We would hope that the Soviets would prefer the third alternative, because our Type I Deterrence would make the first choice sufficiently unattractive, and our Type II Deterrence would do the same for the second; but we might be wrong, and they might take the first alternative. Or they might take the second alternative in the assumption that we would back down, and we might not.

War by Calculation. War could also result from calculation. After due study, a nation might decide that going to war would be the least undesirable of its choices. Common belief, of course, holds just the opposite: that war could arise only as a result of miscalculation—but this is based on the unsophisticated view that all wars result in automatic mutual annihilation. This could happen, but in all likelihood it would not. One type of war by calculation could occur in the Type II Deterrence situation referred to above. If at that point we attacked the Soviet Union, the damage we received in return would be considerably reduced. We might well decide that our nation was better off to accept this retaliatory blow rather than let Europe be occupied, and also to accept the costs of living in the hostile and dangerous world that would result.

Or, to give another example, the Soviets suffered from 20 to 30 million casualties in World War II, and in addition they lost about one-third of their wealth. It is sometimes pointed out that this did not happen from calculation but was inflicted on a day-by-day basis: no alternatives were ever really put up to them. However, given the nature of the Nazis and their program, I would believe that even the average Soviet citizen (not to mention the government) would have been willing to accept the cost of World War II in order to achieve the position they have since won, as an alternative to Nazi domination.

Another war by calculation would be the so-called preventive war. This does not necessarily mean that one side believes the other is planning eventually to attack the first, which is therefore merely getting in the first blow. One side has only to feel that a war is inevitable—or so likely that it might as well get the disaster over with as soon as it gets a sufficient lead, so that it is safer to seize the opportunity than to wait. Such an edge is most likely to result from a technological change to which the other side has not reacted. The so-called missile gap illustrates how this problem could arise.

The United States SAC (Strategic Air Command) is supposed to be based upon about fifty home bases. If the Soviets happened to acquire, unknown to us, about 300 missiles, then they could assign about six missiles to the destruction of each base. If the Soviet missiles had, let us say, one chance in two of completing their countdown and otherwise performing reliably, then there would only be one chance in sixty-four that any particular SAC base would survive a Soviet attack. There would be better than an even chance that all the bases would be destroyed, about one chance in three that one base would survive, and a small chance that two or more bases would survive.

A missile gap of the sort described is especially dangerous because missile attacks are so much more calculable than any other kind of attack. They are so calculable that many people feel that even a cautious Soviet planner might be willing to rely on the correctness of his estimates; that Soviet decision makers might find it the path of caution to attack while the opportunity was still available.

Actually the results of missile attacks are not mathematically predictable. There are imponderables and uncertainties with regard to such things as reliability of basic data, field degradation, intelligence leaks, and firing discipline so that the probability of something going wrong cannot be predicted. But, so many laymen and professionals persist in regarding the reliable prediction of the results of missile attacks as simple problems in engineering and physics that it would be irresponsible to rely on Soviet caution and sophistication alone as a protection. And if such an attack was successfully carried out, it would truly be a war by calculation.

The need for a quick reaction to even "hypothetical" changes in the enemy's posture is likely to persist indefinitely, in spite of the popular theory that once we get over our current difficulties we will have a so-called minimum nuclear deterrent force that will solve the Type I Deterrence problem. (Some even maintain that it will solve all strategic problems.)

It should be noted that if a serious deterrent gap ever occurred, then, even if the Soviets were not willing, either out of caution or morality, to use their superiority, the situation would still be dangerous. They might well be tempted to a strong (even reckless) foreign policy, if they believed that their military technology entitled them to some gains, or that if they got into trouble they could use their missiles to rescue themselves. This kind of situation could be especially dangerous if the Soviets considered that they could not disclose their superiority, since if they did so, we could take remedial action (e.g., an airborne alert). Still, they might be willing to hint at their superiority, in the belief that this would be just enough to make us weak or uncertain in our response in a crisis, but not move us prior to a crisis to institute the airborne alert in time.

Another possibility for preventive war could occur if an arms-control agreement broke down and one side had a considerable lead, either because of its previous success in evading detection, or its greater ability to re-arm. This side might well feel that, rather than see the world subjected again to all the dangers of an arms race, it would be doing a public service to stop the race, once and for all. And this could best be done by stopping the cause of the race—its opponent. It might be especially willing to start the war soon after the arms-control agreement terminated, because the risks, even if things went awry, would not be so great at the existing low level of arms than before the arms-control agreement had lowered the absolute level of the balance of terror. The rather high probability of war breaking out after the arms race had begun again (but before both states were fully armed) is often ignored. Most writers focus attention on the situation existing at the time of the breakdown, when the posture is still determined by the agreement and on the feasible violations of the agreement, rather than on the situation some months or a year or two later.

Then there is the idea of "preemption," or, as Einstein called it, "anticipatory retaliation." Almost all authorities agree that at present the advantages of striking first are so great that if there seems a high probability that the other side is actually attacking, it may be better to take the certain risk of a relatively small retaliatory strike rather than the high probability of a much more destructive first strike. This calculated pressure for preemption is especially likely in one situation very similar to that of "self-fulfillment," previously discussed. Even if only one side suspects that the other may attack, each can easily become convinced that it should attack—not because it wants to, or even because it believes the other side wants to, but only because it believes the other side may attack simply to preempt a supposed attack by the first (which is itself being launched as a preemptive attack). Schelling has labeled this situation, "the reciprocal fear of surprise attack."[11] As described, it is not a case of miscalculation, but a case of calculating correctly. This is clearly a situation in which each side has nothing to fear but fear, yet the knowledge that the other side is afraid fully justifies that fear.

Many things could touch off a reciprocal fear of surprise-attack situation. The only reason I have put this possibility low on the list of possible causes of war is because of the belief that as long as decision makers are consciously in control of events, they are very much more likely to draw back from pressing buttons and accept any resulting risks, than to do something which would make war inevitable—particularly, if this war were to occur at a time and under circumstances not of their choosing. However, complicated and dangerous situations can occur. For example, suppose that one of our own Polaris submarines accidentally launched some missiles at our own country. Even if the submarine commander succeeded in informing us of what happened before the missiles landed, the accident could still cause a war. The Soviets might observe these missiles exploding and if they did not know where the missiles came from, they might decide that it would be too dangerous to wait. Even if the Soviets knew that the missiles had not accidentally come from a Soviet submarine, they might not believe that we would wait to find out.

We might ourselves be under pressure to attack even if we thought the Soviets knew nothing about the incident because we could not be sure they did not know. It might appear safer to preempt than to let precious minutes slip away while we tried to persuade the Soviets that we knew they were innocent. The possibilities for trouble are almost infinite, and it would be wise to reinforce the natural caution of decision makers with explicit measures, both unilateral and multilateral, to facilitate communication and persuasion and to make waiting safe.

The line between the preventive and preemptive war is sometimes very fine, and it is on this line that some of the most plausible war-making situations can occur. For example, let us imagine the Type II Deterrence situation discussed earlier, in which the Soviets were hypothesized as invading Europe, and we as evacuating our cities as a preliminary to delivering an ultimatum or otherwise exerting pressure. If the Soviets struck us at that time, it would not be a preemptive war, because very likely we would not have made up our own minds as to whether we would strike or not; in particular, we would intend to give them the option of backing down or compromising. However, we are so close to making up our minds that this cannot be labeled as a preventive war, either—a war to head off some generalized future threat. Similarly, if, after evacuating our cities, we gave the Soviets an ultimatum, and the Soviets chose the alternatives of prolonging the crisis, we might decide to strike, even though we thought there was a big chance that they were going to back down eventually. We would not be sure, and if we had already evacuated our cities, the risks of going to war would have been sharply diminished.

There is also a possibility of going to war simply to achieve world domination. Most people (the author included) believe the risks involved in going to war are so great today that no matter how promising an attack might look on paper, the "imponderables" and other "uncertainties" are large enough so that not even a moderately irresponsible decision maker would go to war for positive gains—though one like Hitler might. However, if we ever disarm, either unilaterally or bilaterally, to the point where the available weapon systems do not present the awful potentialities present today, then, of course, this possibility reappears.

Even if decision makers are unwilling to go to war for positive gains, they may still be willing to go to war, if, in their opinion, "going to war" is less risky than not doing so. There are many situations in which this could occur. One could imagine an internal or external crisis getting out of hand, and one which was being aggravated by the opponent, perhaps merely by his very existence. One may then be tempted to go to war, not because it looks so tempting, but because it looks like the least undesirable alternative.

Escalation. The fourth possibility is that of escalation. One can imagine some sort of crisis which gradually increased in violence or scope until it triggered one of the reactions already discussed. This could occur either because the limits of a limited war are not being observed, or because more parties are being drawn into it, or because the issues themselves become fraught with significances that did not initially exist, or because of some unauthorized or accidental behavior by subordinates. It is difficult to supply a plausible reason for escalation, when it is to everybody's interest to control things, yet almost everyone considers that it can and perhaps will happen.

Escalation is possible particularly if one of the two contending sides does not think through the consequences of its actions. To return to the Type II Deterrence situation discussed above: it is perfectly conceivable that the Russians, looking at the 60 million hostages we have in our 50 largest cities, might decide that it was safe to attack Europe, and that we would not attack them in retaliation. They might also vaguely realize that if they attacked Europe, we would probably evacuate the 60 million hostages; but they might not understand the full consequences of that evacuation, in terms of the psychological stiffening of the backbone and the enormous decrease in the risks this country would be running if it went to war.

The possibility of escalation actually plays a useful role in deterring certain kinds of crises or limited wars. For example, it is quite clear that the nuclear-weapon systems we and the British have in Europe are on the whole fairly vulnerable to Soviet attack, so that they have little second-strike capability. Yet the Soviets might be afraid to destroy them in a limited European attack, for fear that the level of by-product destruction would automatically cause escalation into an all-out World War III. On the other hand, if the Soviets did not destroy them, the Europeans might use them, and this in turn would not only be damaging to the Soviets, but might also cause escalation into World War III. This means that lower than all-out attacks are deterred for fear they will escalate. The same mechanism holds, for example, if we decide to open a route to Berlin by force if the Soviets or East Germans try to close it. The Soviets have the capacity to apply all the counterforce they need to stop any such action. The purpose of the action is not to overwhelm Soviet countermeasures, but to make it clear to them that the stakes are large. It is perfectly possible that we might be willing to take a small risk of an all-out war, even if we were not willing to go immediately into an all-out war. The action might be effective precisely because it was so dangerous. To the extent that various types of arms-control measures reduce the possibility of escalation, then to that extent the deterring effect of escalation on limited actions is decreased. The author finds this no reason for not carrying through such control measures, but he knows many Europeans who are antagonistic to any reliable limits on the use of violence, for the very reason that such limitations increase the probability of a provocation at that limited level.

Catalytic War. The last possibility is the catalytic war. This is the notion that some third party (or country) may deliberately start a war between the two major powers for reasons of its own. As it is usually discussed, the concept holds that some power which is third, fourth, or fifth in the international hierarchy wishes to improve its position by arranging for the top two nations to knock each other out, thus moving itself up two notches. This is one of the major reasons why some people fear the dissemination of nuclear weapons to "ambitious" powers. However, there are several reasons why this particular concept is not considered plausible: (1) risks are so great for the triggering power that it is difficult to believe that one power could make and carry out such a decision, (2) more important, the United States and the Soviets will probably put into effect slow-reacting systems with a lot of stops in them before the decision for all-out war is reached. This means that it will be much harder for a third party to start a war than is often imagined, though if it tries hard enough and has a large enough capability, it is not impossible.

There is another type of catalytic war which I think much more likely and important: a desperate third nation thinks it has a problem that can be solved only by war. Let us imagine a war between India and China which the Indians were losing. The Indians might also feel that if they induced the United States to strike at China and Russia, this would solve their problem, and any method they used to achieve this end was as good as any other. Conversely, let us imagine a situation in which the Chinese felt hard pressed (possibly over Formosa) and told the Russians, "We are going to strike the United States tomorrow, and you might as well come along with us, for they will undoubtedly strike you, even if you do not do so."

As stated, the situation may seem somewhat implausible, but one can devise hypothetical situations which make it seem more plausible than I have done here. One may wish to broaden the definition of catalytic war. Any method by which a nation uses military or diplomatic power to embroil larger nations or increase the scope of the conflict could be called catalytic. By this definition, World War I was a catalytic war, set off by Serbia and Austria, which also had some overtones of "reciprocal fear of surprise attack" and "self-fulfilling prophecy," because the side which mobilized first was likely to win. It meant that even a defensive mobilization (by the Russians) touched off a defensive-offensive mobilization (by the Germans), in much the same way some believe that a badly designed, quick-reacting force can be touched off by defensive moves by the other side.

The Arms Race Itself

In discussing the Doomsday Machine as a weapons system, including computer and sensors, I have been dealing with a somewhat romanticized and (one hopes) very remote possibility. I have spent so much time on it partly to highlight and satirize some current notions (e.g., some extreme forms of Finite Deterrence). For this reason, much of the section on "hypothetical ultimates" has been cast in a "reassuring" tone; but the mere fact that one feels it necessary to discuss soberly the use and construction of Doomsday Machines indicates in the most dramatic manner that the current arms race has changed in character from previous arms races. The issues are bigger and may eventually come to the stage of Doomsday Machines or close approximations of these devices. However, one does not have to allude to the Doomsday Machine to be concerned about the arms race and current capabilities. Our normal military forces are frightening enough, and they are improving rapidly (though in some ways the newer systems—Polaris and Minuteman—are less destructive than the old ones).* The most spectacular thing about the arms race is that it *is* a race, and one that is being run with some celerity.

This is also a new thing. There has been some tendency in the past for the military to exploit the products of civilian research and development, but this attempt has been remarkably lackadaisical. There has been even less research and development done specifically for war. (The common belief that the search for improved weapons has been a major source of technological progress seems to be grossly exaggerated, at least for periods of peace, though long wars such as the American Civil War and World Wars I and II did see technological advances spurred on by the requirements of the war.) Previously, really big wars have tended to occur twenty and thirty or more years apart, and there has been a tendency for each war to start where the last one left off or even with more ancient techniques.

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* This has been done because of weight restrictions on the warheads for these missiles, not because of humanitarian considerations.—Ed.

Even so, each war has brought startling and unexpected surprises. (For example, the development of the most characteristic feature of World War I, the long line of trenches stretching from the Alps to the English Channel, seems to have been considered by only one writer, Jean de Bloch, and though widely read, he had no impact on military planning.) Now, for the first time in history, we are having a complete technological revolution in the art of war approximately every five years. As a result, we are now three technological revolutions away from World War II. Any attempts to apply the concepts and rules of common sense derived from that experience run the grave risk of being as outmoded as some American Civil War concepts would have been in World War II. In so far as we are trying to plan for the late 'sixties and early 'seventies, we are projecting into an environment which is two or three revolutions ahead of where we are today. An examination of the development of military doctrine in the postwar years, in both the official agencies and the *avant garde*, indicates that the possibility of great success in such planning is not high. While doctrine has evolved with meteoric speed as contrasted with the rates before World War II, it has been hopelessly behind events rather than successful in anticipating the future. I will not try to describe this process in any detail, though I would like to describe the technological revolutions, so as to emphasize the difficulties both we and the Soviets have in evaluating the impact and significance of the new developments.

The Technology of 1951. Let us start with the situation in 1951, a convenient date to mark the first peacetime revolution. What follows is a very partial list of the new possibilities (with particular reference to the United States and air warfare) that the military planner (or arms controller) of 1945 would have had to anticipate by 1951: third- or fourth-generation fission bombs; the B-50 and B-36, forming the backbone of the United States SAC; the initial production of the B-47; the first flight of the XB-52; a manual air defense system started; air defense having F-80, F-84, F-86, F-94; production order for Nike A; experimental aerial refueling; nuclear-powered airplane under development; many organizations, in and out of government, formed to institutionalize innovations in air warfare and to rationalize research, development, procurement, and operation; the Russians possessing TU-4 and MIG-15, and having tested three nuclear weapons.

I will discuss only a few items on the above list and on other lists to be given later, but the whole list will remind us of the complexity and speed of the arms race.

The most pressing questions involve the impact of fission bombs. These devices had had a very vigorous development program, and in 1951 we had third- or fourth-generation models available. Would their use have been decisive or not? The Soviets did not think so: they talked smugly of the "permanently operating factors" and the impracticability of blitz-krieg tactics. Many Americans, particularly the advocates of air power, tended to think that nuclear weapons would be decisive, but we had not bothered to get as many bombs as we could or (from the strictly military point of view) should have. Of course, the Soviets had gone into a vigorous development and procurement program for nuclear weapons. But they did not seem to have made any preparations specifically designed to meet the threats that nuclear weapons pose, though they had done a great deal to meet conventional threats typical of World War II.

In 1951 there was still much talk of the scarcity of uranium, a view which was reinforced by most of the technical people. Few people in or out of government thought of the atom bomb as soon being plentiful; nobody realized that practical and convenient thermonuclear bombs would be available before long. But a few people with high security clearances knew that some work on a rather impractical thermonuclear device was going forward. Though there was some discussion in 1951 about "baby atom bombs" with about the same power as the Hiroshima and Nagasaki bombs but much smaller in both weight and size, not even the experts had any idea of the flexibility, efficiency, and economy soon to be available in the atomic weapons arsenal.

Almost all 1951 discussions of defense against nuclear weapons assumed that the bombs were too precious to be used on anything but important cities or the most valuable production targets, such as Oak Ridge and Hanford. Similarly, NATO planned on the assumption that nuclear weapons would not be generally available for the European theatre except for very special and very high priority targets. However, a few economists were already pointing out that since there was a large disparity between the value of uranium and the marginal cost of production, there was every reason to imagine that much more uranium could and would be produced. There was even some reason to suppose that this large increase in production would be roughly at current prices. Most of the military, the scientists, and the engineers did not think that way.

This overvaluation of bombs as being too precious to use on military targets affected defense planning in our Zone of the Interior. Because of the threat of Soviet attacks, the Air Defense Command and the associated Army Anti-Aircraft Command was set up in Colorado Springs in 1951, but they thought of their highest priority job as the defense of large cities and nuclear facilities; the initial deployment of their facilities (radars and fighters) almost ignored warning and defense for SAC in the event of a surprise attack directed at SAC and not at the cities.

In spite of the emphasis on short wars it was not until 1948 that we seriously started to mold SAC into an ever-ready instrument of war. (The accession of General Curtis LeMay to the command of SAC and the Berlin Blockade apparently played the main roles.) We had not quite finished the process by 1951. Neither had we accepted the implications of the Soviet's testing of an atom bomb. For example, the official point of view (to be reflected soon in the investment of some 11 billion dollars in war reserve tools and raw materials), as opposed to that of the air-power enthusiasts, held that an all-out war of the mid-1950's would be long—from three to five years—even though initiated with atomic weapons.

While it is easy to show that most of these planners had not thought about the problem and were just reacting in a World War II fashion, given the official assumptions as to the scarcity of bombs, they may well have been right about the length of the war. Nobody could show just by physics and engineering that a small number of fission bombs dropped on Russia would in fact have caused them to sue for peace. In fact, one could almost have shown the opposite: that the Russians accepted much more damage in World War II and continued to fight, so that unless such imponderables as the psychological and disorganizing impact of using even a small number of bombs were great, a long war would have been possible.

One thing was almost always completely overlooked in 1951: the possibility that war could have broken out under such circumstances that the United States might not have succeeded in using very many bombs. We had only a small number of SAC bases (18 in 1950,[12] including some strategic fighter bases that did not pose a serious threat to the Soviets) and no organized warning system worthy of the name.

(There was not even a Ground Observer Corps, for this organization dates only from 14 July 1952.) Furthermore, under normal conditions, SAC operated unalerted and would have taken some hours before it could get its planes into the air just to evacuate—even longer before the airplanes could have been prepared to go on a mission. Under these circumstances, just a handful of Russian planes carrying a very small number of atom bombs might well have been able to wipe out a large segment, possibly approaching 100 percent, of our strategic military power in a few hours. (I use the term "few hours" deliberately. The Russians needed no superb coordination or piloting to do this task. They simply had to be able to fly from one point to another point, more or less on a Great Circle route.)

In some ways the lack of concern in 1951 for the ground vulnerability of bombers was surprising. Many people had written or lectured about the importance of our having a secure and invulnerable SAC. Furthermore, it was part of both Douhet* and Air Force doctrine that war in the air is decided by the destruction of the enemy air force on the ground. Last, less than a decade had passed since the "bolt out of the blue" at Pearl Harbor. Nevertheless, there was a real doctrinal lag, which by the mid-fifties was just being made up. It is rather interesting that it was the advent of the ICBM, rather than the fact that the Soviets had acquired a strategic bombing force, that persuaded most people to think the vulnerability problem through and learn to distinguish between First Strike (attack) and Second Strike (retaliatory) forces. As long as the problem had any subtlety at all, most people managed to ignore it. One wonders what subtle doctrinal lags exist today.

It was quite true in 1951 that even though the Russians had the basic equipment they needed—the bomb, and a plane which when refueled could reach its target—they probably had neither the tactical knowledge, the operational capability, nor the strategic doctrine which would have enabled them to launch such an attack out of the blue. In fact, given their strange lack of emphasis on aerial refueling (an absolute must for any Soviet war planner devising an attack on the United States), one could have argued that the Soviets were basically planning to refight World War II, and, for example, had built hundreds of submarines to stop convoys of the type of World War II.

In addition, Stalin and his military advisers seem to have been reasonably, if not excessively, cautious. They were willing to fill power vacuums and press relentlessly, but not too aggressively. They were willing to take small but not large risks. There is even evidence that they tried to restrain the Yugoslav, Greek, Indochinese, and Chinese Communists from being too provocative.

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* Douhet was an Italian strategist who developed in the 1920's much of the air-power strategy later used in World War II. See Bernard Brodie, *Strategy in the Missile Age*, Princeton University Press, 1959.—Ed.

However, it also seems likely that Stalin's caution did not stem from fear of the atomic bomb as a decisive weapon. What alarmed him about the United States was Detroit—not SAC. He appears to have been convinced that no sensible government should tangle with a nation that had a gross national product of 350 billion dollars a year. We had both assets, the bomb and the GNP, so that any difference between the point of view of the United States and the Soviet Union was not crucial.

It should be quite clear, even from the superficial discussion above, that any arms-control system set up in 1951 might easily have been based on some serious misunderstandings of the implications of the technology then current, and on even more serious misunderstandings of the future. In particular, some kinds of inspection schemes might have resulted in making our vulnerabilities both crystal clear and very tempting to Stalin or some of his military advisers. Even to force the Soviets to go through the intellectual exercise of thinking these problems through might have been dangerous. Before we could have safely started discussion of "the control of surprise attack," we would have had to fill in the gaps in our defense posture—that is, engage in a limited rearmament program.

The Technology of 1956. Let us now look at the technology of 1956. It included such factors as: third-generation thermonuclear bombs; three nuclear powers; the last B-47E produced; B-52 and KC-135 being phased into SAC; B-36 being phased out (the last B-36J was produced in August 1954); B-52D in production; B-58, Snark, and XP6M-1 (Martin Seamaster) flying; Regulus I, Nike-Hercules, and Falcon missiles in service; Atlas, Titan, and Thor in crash programs; many other missile programs in progress; Century Series of fighters (F-100 to F-104) being phased into the Air Defense Command; the DEW line being built; MB-1 (nuclear warhead for air-to-air rockets) being tested; production order for Missile Master and SAGE; classified intelligence projects such as the U-2, Turkish Radar, etc.; an atomic-powered plane and rocket under development; an atomic-powered submarine launched; research and development becoming the major business of the aircraft industry, and procurement becoming secondary; the Russians having the Badgers, Bears, Bisons, IRBM's, and their own models of H-bombs.

The most startling change was the development and perfection of thermonuclear bombs. Probably this introduced a more radical change into the technology of war than the introduction of the atom bomb did. The difference between megaton and kiloton is very large, in some ways relatively larger than the difference between kiloton and ton.

The effect of the innovation shows up in the nature of the questions one tends to ask. For kiloton bombs, one asks how much is destroyed—but, barring an extreme course of military events, no one doubts that the nation will continue in some form. With multimegaton weapons, the question of the continuation of the nation (to some, of civilization) is raised even in the shortest of wars. Megaton weapons are comparable to gross forces of nature such as earthquakes, hurricanes, etc. The prospective effects of the use of such weapons are not only extremely widespread, they are also occasionally very subtle and hard to predict. As a result, for the first time in the history of war we have what might be called *the problem of the post-attack environment*. Partly because of one of these environmental effects (fall-out), and partly because we had not thought about or prepared for nonmilitary defense including recuperation, it is most unlikely that the United States really possessed in 1956 and later years much objective Type II Deterrence. But nobody knew it, so we did not suffer any disastrous losses in 1956. However, the instability of such psychological capabilities began to show up even before the next technological revolution in 1961.

Let us look at this notion of post-attack environment in more detail. Multimegaton bombs are so powerful that even if they do not destroy a system, they may damage it by some subtle effects or so change the environment that the system will be temporarily inoperable. The various effects of nuclear weapons include blast, thermal and electromagnetic radiation, ground shock, debris, dust, and ionization—any of which may affect people, equipment, the propagation of electromagnetic signals, etc.

It is quite possible that some of our current systems may have important hidden defects that will only be disclosed by an attack. In the last few years I have worked on several weapon systems in which new weapon effects or new interpretations of old weapon effects were found that had not been thoroughly allowed for and which could have been disastrous. I therefore find it hard to believe that we have uncovered all of the problems from which our systems may suffer. An extreme dependence on such theoretical investigations as a substitute for (unobtainable) experience can be dangerous. For example, imagine that our total posture has ten serious weaknesses in it, but by dint of hard work and much investigation we discover nine out of ten of the weaknesses and correct them. Imagine also that the enemy is trying to find these same weaknesses and succeeds in finding nine of them. Unless the overlap is complete and we have found exactly the same weaknesses, then the enemy has discovered a weakness which he can exploit. If the processes involved were purely random, there would be a 90 percent probability that the enemy had found the one weakness we failed to correct. In practice, the situation should not be that bad: the weakness that was hard for us to find is probably just as hard for the enemy to find. But even if the enemy does not find some weakness that he deliberately exploits, it is not at all clear that we will be able to predict the post-attack environment in enough detail to be able to take into account adequately all of the phenomena that will occur.

Technological Advances by 1961. Let us now glance at some of the technology we shall be facing in 1961: arms control (techniques and capabilities); satellites, such as Tiros, Transit, Notus, Discoverer, Pioneer, Mercury; soft Atlas and soft IRBM's deployed; 25-psi Atlas, 100-psi Titan, and Polaris being phased in; several guidance "breakthroughs"; a crash program on Minuteman and other second-generation missiles; B-47E, B-52H, B-58 forming the bulk of SAC; BMEWS being phased in; Goose, Navajo, Regulus II, Seamaster, etc., canceled; SAC operating alert and dispersed; inexpensive, efficient and versatile bombs; four nuclear countries; SAGE and Missile Master partially deployed; Bomarc A and Hawk being phased in; Nike-Hercules, F-100, 101, 102, and 104 in service; limited Civil Defense (?); X-15 test vehicle; a nuclear-powered plane and rocket still under development; experimental nuclear explosives; the Russians having . . . . ?

The year 1961 will find arms control having some influence on our military posture. On 31 October 1958 the United States suspended the testing of nuclear weapons, and 1961 is likely to be the third year of no weapon-development testing on the part of the United States. Thus, 1961 should be the third year of an uninspected moratorium, and, in addition to all the other uncertainties of a United States military planner, there will be such questions as, "Are the Soviets cheating? If so, to what extent? And what is the military significance?" Even if a treaty were to be signed by the time this paper is published, it will take a period of from two to five years to install and proof-test whatever inspection network is agreed upon.

The test-suspension negotiations at Geneva illustrate the importance of doing our homework. In July and August of 1958, the Western and Eastern experts at Geneva agreed, after a short hectic conference (at which most of the technical facts were worked out in late evening sessions) that about 180 stations around the world (about 21 in the Soviet Union) would suffice to pick up illegal explosions greater than 5 kilotons in yield. Within months, on the basis of new data and experiments, the Western experts decided they had been off by at least a factor of four. A few months later, several ingenious schemes (testing in big holes or outer space) were worked out to evade the proposed inspection system almost completely, as far as tests of the kiloton type were concerned.

From the viewpoint of arms control, one of the most dangerous innovations of 1961 is the possibility of the experimental use of nuclear explosives in one or more peacetime applications. In May 1959 the Atomic Energy Commission sponsored the Second Plowshare Symposium on the Industrial and Scientific Uses of Nuclear Explosions. At an earlier symposium there had been much interest in the subject, but nobody expected anything to happen very soon. By the second one, many of the ideas had had time to mature. There were about fifty papers presented at the symposium on various aspects of nuclear explosives. The suggestions for peaceful uses of nuclear explosives included: artificial harbors, sea-level ship canals, underground oil storage, power, isotope production, geothermal steam plants, salt water distillation, improvement of underground water supplies, mining, shale oil production, meteorological experiments, and other scientific experiments.

The length of the above list should not surprise the reader. Nuclear explosives are a uniquely concentrated but very simple and relatively cheap source of power, heat, and pressure, as well as of neutrons and other radiation. Once they become even slightly available, many people will look for and find applications for these new devices, which in turn will make them even more available. In fact, the terms on which they are available at this writing were spelled out by the AEC at the Second Plowshare Symposium as follows: roughly a half million dollars will buy explosives in the low kiloton region, and perhaps a million dollars will buy them in the low megaton region. The AEC is careful to note that the above charges are for small quantities.

Very few people at the 1959 symposium would have accepted even odds that a number of the ideas discussed would not be in programs by 1961. In particular, a project to dig an artificial harbor in Alaska is definitely programed at this writing. Since some of the individual projects promised to use hundreds or even thousands of bombs, it is not impossible that even a private international market of buyers and sellers of nuclear explosives could eventually spring up. This last is particularly likely if there is technological progress in the design of very simple bombs made of readily available materials. Once there develops a legitimate market for nuclear explosives, then in the absence of controls many nations will manufacture them for sale or peaceful use, if not by 1970, then by 1980. However, unless one of these nations is very irresponsible, there should be a fair degree of voluntary control over the distribution of these devices.

I will discuss later some of the problems that might arise as a result of the possible dissemination of nuclear weapons. I should point out that at the present writing, however, it is rather unlikely that nuclear explosives will be as successful as I have indicated they might be. As Lewis Bohn has pointed out to me, the above discussion mirrors almost exactly the early (incorrect) postwar expectations on the speed of development of nuclear reactors and the consequent strategic and control problems. Much of the Baruch plan for the control of nuclear weapons was preoccupied with this much overestimated problem.

I believe that a much better economic and technical case can be made for the use of nuclear explosives than could be made for the early postwar reactors. In addition, there is a much smaller distance between a nuclear explosive and a bomb than between a reactor and a bomb. In the first case, the distinction is often a semantic one; in the second case, one may need a major chemical industry. I therefore believe that if nuclear explosives do not present a problem, it is likely to be because of legal, social, and political obstacles to this development rather than technical and economic ones. This is one place where the pursuit of a higher standard of living for all may result in a drastic reduction.

The Mid-1960's. We have just been looking somewhat superficially at the early 'sixties. I would like to give only a bare listing of the possibilities of the mid-sixties, labeled 1965 for the sake of definiteness. (The reason there are only four years between this technological revolution and the last—I had been using five years between these revolutions—is that technological innovation seems to be even faster today. We are spending more money on research and development, and getting more skillful in its management.) By 1965, then, we would expect to have some of the following: independent nuclear deterrents; Minuteman B and Polaris C; second-generation Atlas and Titan; Dynasoar; BMEWS-B, Midas, and SAMOS; protected B-52G and H, B-47E, B-58A and B; the limits of bomb technology (if testing is continued); commercial nuclear explosives; an airborne ballistic missile; super-guidance; SAGE B, Bomarc B and C, Nike-Zeus A and B, Hawk B, F-108, B-70 technologically possible, but perhaps canceled; antiradiation drugs; protected command and control; exotic fuels and propellants; an inexpensive reliable research missile; inexpensive satellites; a nuclear-powered airplane (?) or rocket (?); experimental climate control; bacteriological and chemical warfare; and astronauts.

The 1970's. Rather than comment on any of the above, I would like to deal with some of the possibilities for the late 'sixties and early 'seventies, which I will label 1969. We now have to take into account more than just the extrapolation of current technology. We have to consider the possibility of "breakthroughs" and other surprises. Although it is not possible to limit or describe in advance what breakthroughs might occur, it is possible to discuss some projects currently being studied which might be called breakthroughs, if successful. This method of trying to estimate the total impact of technological progress is likely to involve some large underestimates of the total change, since one can almost guarantee that many startling and unexpected developments will occur. I will try to make up for this by some judicious exaggeration in the areas to be discussed, for such an exaggeration will give a better "feel" for the over-all possibilities for the late 'sixties or early 'seventies than a more sober discussion of the few items I will consider: cheap, simple bombs; cheap, simple missiles; cheap satellites; controlled thermonuclear reaction; other sources of cheap neutrons; other sources of nuclear fuels; Californium bullets; ground-effect machines; reliable sensors; super-calculators; cheap calories; medical progress; advanced materials; cheap, fast transportation (for limited wars); reliable command and control; Doomsday Machines; and disguised warfare.

When we enter the 1970's, the most advanced nations at least will know in theory how to make simple bombs and missiles, and in the absence of explicit or implicit controls will be making them in practice. For this reason, I have put cheap simple bombs and cheap simple missiles at the top of the list because, even with arms control, and certainly without it, these are likely to be the most characteristic features of the late 1960 or the early 1970 period. They may or may not present the most important (and dramatic) problem. This will depend on which nations actually have weapons in their stockpiles, on the expilicit and implicit controls, and on the state of international relations.

Under the current programs, 1969 may be a little early for the diffusion of these devices to other than "advanced" nations. It is very difficult to predict the rate at which the technology, materials, and information will be disseminated. Even without explicit controls, it might be the mid-1970's or even a later period before they become cheap and simple for the majority of "developed" nations. But there are many things that could accelerate this dissemination process: the use of nuclear weapons in a limited war; successful programs for the peaceful uses of nuclear explosives in the mid-1960's might at least make nuclear "devices" widely available; the deliberate diffusion of nuclear technology, by either the United States or the Soviet Union, to enough allies so that there will be no more secrets; a breakthrough in technology or materials, etc.

As an example of this last possibility, consider the fusion reactor. It is improbable that this device will be practical by 1969; most experts in this field are somewhat doubtful about any real success before the year 2000. Let us, however, go ahead and outrage the experts by assuming not a qualified, but an outstanding success—such a success that even relatively primitive nations will find it possible either to build or buy a fusion reactor and thereby to acquire a virtually unlimited source of cheap power. This spectacular gift of technology has a significant side effect: it gives off neutrons very copiously, so copiously that it may not be exaggerating to state that the neutrons are for all practical purposes free.

Free neutrons would mean that many kinds of nuclear fuels would be very cheap. With these nucelar fuels and with the kind of technology that is likely to be available in 1969, it may literally turn out that a trained and technically minded person, even one who is a member of a relatively primitive society, would be able to make or obtain bombs. This would raise forcefully the question of the illegal or uncontrolled dissemination of bombs. (One can today buy machine guns, artillery, tanks, and fighter aircraft on the gray market.) Thus the 1969 equivalent of the Malayan guerrillas or the Algerian rebels or the Puerto Rican nationalists, or even less official groups such as gangsters and wealthy dilletantes, might be able to obtain such bombs.

Even if the controlled thermonuclear reaction does not prove to be a success by 1969, there are other possibilities for the cheap production of neutrons. For example, many of the commercial uses of nuclear devices would release neutrons as a by-product. This might lead to either the clandestine or open production of weapon-grade nuclear fuels. There are also possibilities that simple and inexpensive methods for producing weapon-grade nuclear fuels will be developed. It is also possible that we and others will learn how to make bombs using only or mostly materials already widely available, such as deuterium and lithium. (The widely discussed small "clean" bomb would probably use such materials.) In a word, 1969 (though more likely 1979) may see the introduction of the era of the conventional nuclear bomb in which (in the absence of adequate controls) any "legitimate" nation can get some models, and some illegitimate groups or governments may also get access to nuclear weapons, but presumably under more onerous conditions than those to which legitimate purchasers are subject.

Consequences of the Spread of Weapons. We may be too frightened of the possible consequences of the widespread diffusion of weapons. It is quite clear that if one gave the Egyptians and Israelis atomic weapons, one is likely to find both nations acting much more cautiously than they do today, simply because the consequences of "irresponsibility" would be much more disastrous. On the other hand, even a greatly increased sense of responsibility may only mean that, instead of falling upon each other the week after they come into possession of these weapons, the attack may be deferred for a year or two.

In fact, almost any sober analysis indicates that it is somewhat harder for "Nth" countries to cause a cataclysm than is often believed.[13] It is difficult to imagine that China or France, for example, could in the next decade obtain a large enough strategic force to strain United States Type I Deterrence seriously, although the situation in the 1970's and 1980's could become much more difficult. It is even difficult to imagine one of these nations being able to start an accidental war, if the Soviets and the United States have made sensible plans to prevent this eventuality, and it is a little difficult to understand why they would want to start one, unless they were in some kind of a crisis which would be helped by such an action. In this last case, the Soviets and the United States would be likely to be on their guard.

All of the above may be true. Even though it is going to be difficult to get nations to make the necessary concessions until the dangers are both more apparent and more pressing than they are today, nevertheless, I believe that we should still try to make international arrangements *before* the weapons have been distributed, rather than *afterward.* While it is quite possible that many laymen overestimate the immediate impact that the widespread dispersion of weapons will have, I strongly suspect that the "sober" analysts underestimate both the immediate and long-term problems. I will list ten such problems here. It would not be difficult to list many more.

In a nuclear world, the "small" powers, vis-à-vis one another, would have: greater opportunities for blackmail and mischief-making; greater likelihood of an accidental triggering of weapons; an increased possibility of a "local" Munich, a Pearl Harbor, and blitzkriegs; pressures to preemption because of the preceding three items; a tendency to neglect conventional capabilities because of an over-reliance on nuclear capabilities; internal (civil war, a *coup d'état*, irresponsibility, etc.) and external (the arms race, fear of fear, etc.) political problems.

Nuclear diffusion to small powers would also: create a situation in which the diffusion of nuclear weapons to irresponsible or criminal organizations and individuals is facilitated; complicate future problems of control by making such control involve the small powers' having to accept an obvious reduction in their sovereignty (that is, they would give up something, rather than abstain); give the Soviet Union or another large power many opportunities to act as agent-provocateur; and create the capability, and therefore the pressure, for many nations to make a crisis serious or to exploit an ongoing crisis (such as by catalytic war or escalation).

In short, the diffusion of nuclear weapons may or may not increase the number of crises, but it will almost undoubtedly tend to increase the seriousness and the grim potentialities of any crisis or even the misunderstandings that do occur, besides increasing enormously the importance of having responsible and competent governments everywhere.

The widespread possession of nuclear weapons and delivery systems strikes many observers as similar to situations in physics that may be described as semi-stable equilibrium. For example, imagine a ball balanced on top of a small cup so that small movements of the ball can be tolerated, but not large ones. If this ball on the cup is isolated, it might sit there on top of its cup forever, but if it is submitted to the vagaries and chances of a sufficiently uncontrolled environment, one can guarantee that sooner or later it will fall. This may be true even though every "reasonable" analysis of the situation that looks at probable or plausible disturbances showed that the forces were in close enough balance so the ball should stay where it is. It takes an improbable or implausible force to topple the ball. But some improbable and implausible events will occur and, barring a major change in the situation, almost certainly the ball will eventually fall. While the analogy may simultaneously be apt and yet misleading, many who have thought about this problem have come to the conclusion that reliable stability can only come through an international agency with an effective monopoly of force.

For many reasons, I do not believe that the twentieth century will see a disarmed world, but it may see a world government or the equivalent.[14] Until that day arrives, it will be of great value to try to keep, indeed *make*, the problem of national security intellectually and diplomatically simple, and the diffusion of nuclear weapons would seem to go exactly the wrong way. The "two-power" case seems both intellectually and practically more controllable than the "N-power" case. The diffusion of nuclear weapons not only complicates the over-all "analytic" problem, but the stakes at risk if events go badly would seem to be less in the "two-power" than in the "N-power" case.

Conclusion.

In this paper I have scarcely been able to touch upon the complexities of the technological arms race and the stability of the United States-Soviet balance of terror. I have tried to point out that technological progress is so rapid that there are almost bound to be doctrinal lags. These doctrinal lags will in themselves be dangerous, leading to important gaps in our preparations, the waste of badly needed resources on obsolete concepts, the neglect of possible strengths, the excessive use of especially glamorous tools, and, possibly most important of all, heightened possibilities of serious miscalculations or accidents because we have not had time to understand and make provisions for the requirements of the newly installed systems. To the extent that arms-control measures are supposed to alleviate dangers or costs by allowing the current "balance of power" status and military competition to be conducted, by agreement, at cheaper or safer levels, or to the extent that one hopes to increase each state's objective capability of preventing surprise attack or other disaster, this inability to understand "the military problems" introduces almost intolerable complications. (The reason for the adverb "almost" is that we have these complications, whether or not we have arms control.) I have almost ignored the even more complex problem of the conduct of international relations in a world in which force is becoming both increasingly more available and increasingly less usable, a problem that is complicated by the spectacular increase in the number of sovereign nations, by increased nationalism, militarism, and "ambitions" in these new nations and governments, and by the revolution of rising expectations.

Any attempts to control the arms race must be able to live with all the stresses and strains that the above problems will create. It is most unlikely that all of these problems will be solved in an atmosphere of good will and common fellowship, or by the use of *ad hoc* committees and intuitive judgments derived from experience in almost irrelevant situations.

REFERENCES

1 This paper is based in part on a forthcoming book, *Thermonuclear War: Three Lectures and Several Suggestions,* to be published by Princeton University Press in November, 1960. I am indebted to Lewis Bohn and Fred C. Iklé for several helpful comments, some of which are acknowledged in footnotes.

2 RAND Paper P-1888-RC, *The Nature and Feasibility of War and Deterrence.*

3 "Reaching 1975," *The New Leader* (in press).

4 While I would not care to guess the exact form an efficient Doomsday Machine would take, I would be willing to conjecture that if the project were started today and were sufficiently supported, one could have such a machine (or close approximation to such a device) by 1970. I would also guess that the cost would be between ten and a hundred billion dollars. Even then it might not be possible to destroy groups of especially well prepared people. The mechanism one would use would most likely involve, not the breaking up of the earth, but the creation of really large amounts of radioactivity, or the causing of major climatic changes.

5 I should make the point, though, that contrary to many common statements, current (1960) weapons systems are not Doomsday Machines or even close to being such devices.

6 This is actually an extreme view of the German situation. During most of the period 1933-1944 Hitler was restrained by "responsible" elements, and many of his gambles were actually hedged. On many occasions in which he seemed too reckless, military groups prepared a *coup d'état* should he go too far. It is more feasible to survive and recuperate from a war than is generally thought.

7 RAND Report R-322-RC, *A Report on a Study on Non-Military Defense,* June, 1958, has a description of the possibilities.

8 *The New York Times,* 22 April 1958.

9 Peter Bryant, *Red Alert.* New York, Ace Books, Inc., 1958.

10 Bertrand Russell, *Common Sense and Nuclear Warfare.* New York, Simon & Shuster, 1959.

11 T. C. Schelling, *The Strategy of Conflict.* Cambridge, Harvard University Press, 1960.

12 Testimony of General LeMay before the 1956 Subcommittee on the Air Force, Senate Armed Services Committee, page 135.

13 See Fred C. Iklé, *Nth Countries and Disarmament,* P-1956, The RAND Corporation (April 1960), for further discussion of this important problem.

14 An international agency with a near-monopoly for force might come from

any of the following possibilities, listed in order of apparent probability rather than desirability: (1) a Soviet or United States-dominated world arising most likely out of war; (2) some other results of a war; (3) a Soviet Union-United States combination which is in effect a world government, though it may not be openly called so; (4) some of the NATO nations and China added to the above combination as influential, if not equal partners; (5) the Haves against the Have Nots, probably without exploitation, and, perhaps, with aid to underdeveloped nations, but with stringent arms control in which authority and responsibility are roughly proportioned to military and economic development; (6) a sort of world federal state in which power is proportioned to sovereignty and population, as in the United States Congress.

While many of the above possibilities may strike most readers as unpleasant or undesirable, it is quite possible that even a "bad" world government is preferable to an accelerated and uncontrolled arms race. It is to be hoped this last will not be the only choice available.

EDWARD TELLER

The Feasibility of Arms Control and the Principle of Openness

THE ISSUE OF PEACE is rightly uppermost in the minds of our generation. Those of us who have participated in the invention of modern means of destruction feel a special desire to contribute toward peace as best we can. In the popular mind peace and arms control are closely linked. It is clear, however, that disarmament is desirable only to the extent to which it will promote peace.

The Relation Between Arms Control and Peace

Historically it would appear that the relation between arms control and peace is dubious. Most people believe that World War I was brought about by an arms race. There is good evidence to support this view. On the other hand, there can be little doubt that World War II was caused by an uncontrolled race for disarmament. The peace-loving nations disarmed; thereby they gave one lawless government a chance to bid for world domination. Historical analogies are not conclusive, but it seems to me that it is more valid to compare the present situation with the history of the 1930's rather than with the history of the early years of our century.

There are many well known arguments both for and against arms control. Perhaps the strongest driving force toward arms control is the conviction that without it a world catastrophe of unimaginable magnitude cannot be prevented. It is hoped that an arms-control agreement can prevent the further spread of the knowledge of nuclear explosives. It is argued that arms control is in the interest of both the Russians and ourselves, and therefore we can come to an agreement. It is hoped that arms control will be a first step toward increasingly friendly relations and genuine cooperation between all people in the world.

On the other hand, arms control may well lead to a change in the balance of power with the result that the Russians could gain overwhelming superiority. This can happen by reducing those categories of arms in which we enjoy an advantage. Or else it may happen that the arms-control agreement cannot be enforced; it may then be observed only by our side but not by the Communists.

Finally, it may be urged that the regulations and the policing which will have to accompany arms control will give rise to suspicions and to friction. Thus arms control would become a source of irritation rather than a first step toward peace.

There is no doubt in my mind that human contacts between all people will promote the cause of peace. This is particularly true if these human contacts lead to positive and valuable accomplishments. Joint work on medical problems or on the exploration of our globe and the oceans of air and water are cases in point.

On the other hand, it is undeniable that disarmament may lead to frustration, friction, and failure. Therefore, there is at least some doubt whether or not arms control is the proper first step in creating a peaceful atmosphere.

A Third World War

That a third world war would be catastrophic cannot be questioned. Some people have argued that it is better to surrender than to risk the dangers of such a war. This point of view cannot be attacked on the basis of logic. But, in viewing it, it is relevant to reflect how catastrophic a third world war may in fact be.

Extremely little thinking has gone into the question of passive defense against an atomic attack. I believe that an extensive shelter program would save the great majority of the people in the United States even in case of a most ferocious attack. It is certain that such an attack would wipe out our industries, but past experience as well as some research on the question of possible reconstruction have shown that the United States could recover from an all-out attack in a small number of years. This, of course, could be done only if we prepare properly. It is estimated that forty billion dollars, which is equal to one year's military expenditure, could go a long way toward insuring the survival of our nation. Twice that amount would make our passive defense satisfactory. Unfortunately, we are now spending for passive defense an amount which is approximately one-thousandth of our military expenditure.

It is, of course, of paramount importance to avoid the great suffering that a third world war would cause. But it does not seem proper to state that there are no alternatives to surrender. Arms control is justified only in so far as it decreases the probability of war without creating a situation in which surrender will become inevitable.

The Spread of Nuclear Weapons

A short time ago we were worried about the fourth-nation problem. We are now faced with the fifth-nation problem. How long or how short a time will it be before this turns into the sixth- or seventh-nation problem? It has been claimed that the cessation of nuclear testing is the only hope we have for limiting the number of nuclear powers. I wonder whether this hope is realistic.

We like to believe that to produce nuclear weapons requires great skill. We imagine that there is a secret of nuclear weapons which we can continue to guard. The fact is that every nation which obtained a sufficient amount of nuclear explosive found out within a very short time how to make nuclear bombs. The really difficult step is the production of plutonium or some equivalent substance. After one has this substance, the rest is relatively easy.

Unfortunately, the production of nuclear explosives is closely connected with the peaceful use of nuclear reactors. We have powerfully assisted in the spread of the knowledge of nuclear reactors throughout the world. We were right in doing so. Otherwise, the world would have bypassed us. But in accepting the unavoidable we have handed to the nations of the world more than peaceful nuclear power. We have also handed them the key to the atomic bomb. This is unpleasant, but it is a fact.

A moratorium on testing is likely to delay the development of nuclear weapons by some nations. These are the nations which are law-abiding, in which the individual citizen has most rights, and in which the government is both unwilling and powerless to pursue secretly a development which the family of nations has outlawed. On the other hand, dictatorships may find it relatively easy to produce nuclear explosives. They may find it unnecessary to perform a test prior to usage or else they may be able to carry out their tests in secrecy. The results will place more power in the hands of dictators throughout the world. Establishing laws which cannot or will not be enforced favors the lawless element. A test ban may demonstrate the truth of this statement on a world-wide scale.

There is one circumstance which mitigates the danger from the spread of nuclear weapons. The next nations in good position to develop these weapons are our friends and allies. We could prevent the uncontrolled spread of nuclear arms by replacing it with a controlled sharing of our own knowledge and nuclear resources. If we did this, the incentive for independent development woud disappear. At the same time we could coordinate to a much more complete extent research on defense problems within the free world. Soviet progress on rockets has shown how necessary it is for the free world to utilize its research and development facilities in the best possible manner.

Of course, the sharing of nuclear weapons with our allies will create difficult political problems. But perhaps it is not correct to say that new problems will be created. It might come closer to truth if we state that the sharing of nuclear weapons will make such problems which already exist more apparent. The interests of the free democracies are quite similar. In fact, the very survival of each of them is gravely endangered if any one of them is conquered. In a shrinking world it is increasingly urgent to link the democracies by a single supranational government. NATO is a first attempt in this direction. The sharing of nuclear explosives may well be the catalyst which will make the establishment of common institutions and common loyalties both necessary and possible.

In the long run it is impractical to limit the knowledge of nuclear weapons to the advanced democracies. The significant fact, however, is that we have some time in which to solve the urgent problem of atomic control among the democracies. Once this has been done, an example and a nucleus will have been created. On the basis of such a new experience in international cooperation we might then be in better position to find the proper way to share full knowledge of nuclear technology with additional nations.

The spread of knowledge is unavoidable. The only practical hope we can have is to find ways of directing and influencing a process which, in the long run, we shall be unable to prevent. If we fully realize that the difficulty is unavoidable, the difficulty itself may become a stimulus. The secret of the atomic bomb is vanishing. If we face this problem, we might make a great and necessary contribution toward constructing a better world.

The Question of Control

The crux of the test ban is the question of control. It is a longstanding and well-founded position of our government that disarmament must not be unilateral and that disarmament must be subject to reliable verification. To proceed otherwise would be to return to the disastrous mistakes of the 1930's.

At first it appeared that nuclear tests could be observed and policed with reasonable ease. The test ban can indeed serve as a good example of the potentialities of policing. Big nuclear shots can be heard around the world, if not by human ears, then at any rate by the big ears of appropriately constructed apparatus. Nuclear reactions also produce radioactivity. It is widely and incorrectly believed that this activity constitutes a serious danger. It is, however, quite true that the activity can be observed at great distances. Furthermore, a detailed investigation of the radioactivity will disclose the time at which the event took place.

In the summer of 1958 experts from the Soviet bloc and from several Western countries, including the United States and the United Kingdom, recommended a system of controls for atmospheric testing. With the help of a moderate number of stations distributed throughout the world and within each of the bigger countries and with the further help of appropriately planned airplane flights, nuclear tests can be policed down to a strength of one kiloton. Even smaller explosions might be noticed, and violators would have to count seriously on the possibility that their acts will be detected.

A similarly favorable technical situation was reported for testing in the oceans. The acoustic signals from underwater tests can be picked up with ease and it seems possible to pick up the radioactivity deposited in the water and thereby to verify that a nuclear explosion has been detonated.

Unfortunately, the observation of underground tests encounters much more serious difficulties. One is that the crust of the earth is a noisy medium. It is hard to distinguish nuclear explosions from the normal noise caused by major or minor earthquakes.

The second is that radioactivity from an underground test is confined to a distance of about one hundred feet or at best a few hundred feet from the explosion point. On the other hand, the uncertainty in locating the event amounts to several miles. To verify by inspection becomes difficult. In the end it boils down to an intelligence operation which must be aimed at tracing the preparations for the nuclear explosion and at finding the actual shafts through which the nuclear explosive had been put into position.

The final difficulty is that nuclear explosions can be muffled. If this is done, they will emit a greatly reduced seismic signal which is exceedingly hard to distinguish from quite minor disturbances in the earth's crust. With the simplest procedures it is possible to reduce the seismic signal by a factor of 300.

The present situation is best characterized by the fact that surveillance of muffled nuclear explosions above twenty kilotons will necessitate 600 seismic stations in the Soviet Union alone. (It is quite possible that many of these stations could be unmanned.) This would have to be accompanied by an extremely high number of on-the-spot inspections. Probably many inspections per day would be required.* The only way that has been proposed to re-establish effective control is to discover by intelligence operations the activities of preparing a site for muffled nuclear explosions. It happens that these preparations are not necessarily conspicuous. Therefore we are led back all along the line to a reliance on intelligence.

The hope that purely technical means will allow us to establish easy control of nuclear tests has not proved well-founded. Big nuclear explosions—above hundreds of thousands of tons of TNT equivalent—can be noticed and identified. Below one hundred kilotons detection of underground shots is dubious, and below twenty kilotons, the detection seems at present practically impossible.

The situation is no better for testing in interplanetary space. One can send out a rocket containing a nuclear warhead and also equipment for detection and communication. The rocket should be fired in such a way as to leave the gravitational field of the earth. After waiting until the rocket reaches a distance comparable to that between the earth and the sun, it should be separated into a portion containing the explosive and another portion containing the rest of the equipment. These two portions should be allowed to drift apart to a distance of approximately ten miles. Then the bomb would explode and the package containing the apparatus would perform its function of observation and coded reporting.

It has been established through careful discussions that this type of operation is feasible. It has also been established that by using this method and by establishing appropriate procedures of concealment nuclear explosions up to the size of five hundred kilotons or half a megaton can be carried out without chance of detection. These discussions were based on optimistic assumptions concerning the background of radiation in space and therefore concerning the possibility of detection. It is entirely possible that even bigger explosions in space can be concealed. Therefore, nuclear explosions underground and in interplanetary space could be carried out up to a considerable size even if we assume that the best possible controls known today have been established.

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* The argument assumes that cavities in limestone can be constructed in a reasonably expeditious manner and that muffling is not limited by the occurrence of salt formations.

There is one way in which nuclear explosions in interplanetary space could be policed in an adequate manner. One could establish a limited number of stations throughout the world which will reliably detect the firing of any outgoing space vehicle. It could then be agreed that every outgoing rocket would be inspected before it is fired. In this way we could be certain that no nuclear devices will leave the earth. Unfortunately, the Russians have rejected suggestions of this type. Therefore, the only plan of policing interplanetary tests which is feasible from a technical point of view is at present excluded because of the attitude of the Soviet government.

It is not obvious to me why this point has not been emphasized more strongly both in the Geneva discussions and in the American press. The on-site inspection of underground shots has developed into a crucial issue. Yet these inspections, even if they were granted in sufficient numbers, would turn out to be difficult and possibly futile. On the other hand, another big area of possible evasion could be adequately policed by a simple and straight-forward method. It is this area in which Soviet technology is known to be ahead. Why do we focus our attention almost exclusively on the prevention of underground testing and neglect the parallel issue of testing in interplanetary space?

At the present time no world-wide system of control exists, and it will be several years before such a system could be put into effect. We could start constructing seismic stations in the United States, England, and Russia as soon as an agreement is signed. To establish the right kind of stations will be a lengthy job even in these three countries. However, it is clear that the inspection system will have to be extended to China, and this will take further time. Finally, if outgoing rockets are not inspected, the policing of interplanetary shots makes it necessary to establish an expensive and intricate system of well equipped observational satellites. At present these satellites are not even designed.

Thus it is clear that several years must pass before any worldwide inspection system can be put into effect. In the meantime there is no objective evidence that the Russians have actually stopped nuclear tests. Underground tests up to one hundred kilotons and interplanetary tests of arbitrary size could have gone on and could continue to go on for several years without any possibility that such tests be detected by any of the physical methods of observation.

There always remains the possibility of Soviet nuclear tests' being discovered by our intelligence. We should remember, however, that the first Soviet atomic bomb test and the Soviet hydrogen bomb test were not predicted by our intelligence. It will not be easy for our intelligence observation to pit its strength against the secret police of the Soviet Union. Furthermore, it is most doubtful whether it will be possible to use intelligence data which are not clearly confirmed by physical organization in conjunction with the international inspection system. Even if we should find out by methods of espionage that the Russians are testing, it will be hard to convince other nations of our findings.

If we have to fall back on intelligence methods, one has to question why arms control should start with a nuclear test ban. Preparation for conventional war involves more people and could be more easily detected by intelligence operations. The proposal to begin with a test ban was based precisely on the argument that a test ban could be controlled by objective methods which do not require conventional intelligence. It seems that this particular argument did not stand up well under detailed scrutiny.

Methods of Detection

We have seen that detection of underground and interplanetary shots is difficult. The obvious answer is: let us find better methods of detection. The total effort that has so far been expended on such detection systems has not been impressive. It is fair to estimate that in the United States approximately twenty million dollars has been spent on this subject. This is a small sum, particularly when one remembers how deeply the results of such investigations could affect our security.

At the same time any such investigation would yield interesting scientific results. Better detection and analysis of the natural movements of the earth's crust would be a most welcome addition to the knowledge of our planet. Satellites sent out to gather information about possible interplanetary explosions would necessarily have to investigate in detail all the various types of radiation which exist in interplanetary space. Quite recently a great and hitherto unknown zone of radiation was discovered: the Van Allen belt. The finer observations which nuclear detection requires will possibly lead to the discovery of other more or less similar phenomena and we shall learn about particles and electromagnetic waves which are present in space but from which our atmosphere is shielding us. If we set out to detect tests, we shall certainly gather scientific facts which in themselves will amply repay the efforts made.

At the same time it may turn out that continued investigation will not lead to an improvement of the detectability of tests. The main difficulty with test detection is not that our equipment is insensitive. The main difficulty is that the effects produced by the tests are small enough to disappear in the natural noise level. One can attack the troublesome question of discrimination but one cannot promise to succeed.

This is particularly true because it is not proper to consider the improvement of detection as an isolated issue. Together with such improvement we must consider methods of concealment. To do otherwise would be tantamount to the efforts of a person who practices playing chess while introducing the rule that black must not move his pieces.

During the past two years methods of concealment have developed much faster than methods of seismic detection. Yet the amount of money spent on the methods of concealment was relatively small —three million dollars. The reason is that detection is closely related to seismology, which is relatively speaking an old art. Whatever progress could be obtained easily has already been achieved and is now available. On the other hand, the manipulation of nuclear explosions is a new experience. It is relatively easy to invent methods to reduce the effects of nuclear explosions or else to modify the characteristics of such explosions in a way which will make it more probable that man-made events will become confused with natural ones.

The most effective concealment to date was obtained by the simple expedient of placing an explosive in an underground cavity.

This method could be further perfected by placing in the cavity substances which can absorb the energy of the nuclear explosion without producing a corresponding pressure. Since it is the pressure that transforms the nuclear energy into earth motion, a reduction of this pressure will decrease the signal. It is entirely possible that the muffling factor can be increased from its present value of three hundred to a value of several thousand. This might be done without an increase of the size of the cavity needed. In fact, one might use this additional expedient to reduce the cavity's size. In this case one probably would not increase the decoupling but would instead make the execution of decoupling easier.

Another approach would be to wipe out the marks which distinguish an explosion from an earthquake. Generally speaking, an earthquake is a complicated and irregular event, whereas a nuclear explosion gives a simpler signal. Two or more explosions could be cleverly arranged in such a way as to produce a type of signal or signature which is not characteristic of a single nuclear explosion and appears more like a disturbance of the earthquake type. At the same time, simultaneous detonations could falsify the apparent position of the disturbance. Explosions set off twenty miles around a center would give signals which would indicate an event at the center. Thus inspection teams would go to the wrong place and could never find the radioactivity.

Recently we have discussed the possibility of a gentleman's agreement which will give us time to develop better methods of detection. We have argued that this gentleman's agreement should be of relatively short duration, such as one or two years. This was done because of the proper apprehension that a longer period would give the Russians a longer time for clandestine experimentation. This indeed would put us at a great disadvantage.

On the other hand, if we limit the gentleman's agreement to one or two years, we run into a different difficulty. Such a proposal will be accompanied in the public mind with the implicit promise that at the end of this period reasonably satisfactory methods of detection will be available. Such methods are not in sight. It is possible that eventually reliable methods of detection will be developed, but it is most likely that if this is at all possible it will take a period of the order of ten years. A gentleman's agreement of one or two years carries along with it a promise and a hope which is completely unrealistic.

All this does not mean that we should not try to improve methods of detection. We should indeed do so. We should spend a considerable sum—for instance, one hundred million dollars per year—on this enterprise. We should execute these experiments publicly and invite the cooperation of everyone who wishes to cooperate. But we should carry out this work on a broad basis including methods of both detection and concealment, and we should not permit that the detection program be hamstrung by the conditions and restrictions which the Russians are attempting to impose. There is so far no shred of evidence that the Russians are genuinely attempting to contribute to the art of detection.

Future Development of Nuclear Weapons

An agreement to discontinue nuclear tests will not hamper work in the Soviet Union. The Russians can violate a treaty in secrecy and with certainty that the violation will not be discovered. This holds even if they perform extended series of nuclear tests. The only question is whether they choose to do so.

Our own situation is rather different. If there is an agreement to stop testing, we shall abide by that agreement. For reasons both moral and practical it is impossible for us to engage in organized cheating.

It would appear most relevant to state in what way the Russians might gain by additional tests. Unfortunately, such a statement requires a detailed knowledge of Soviet military planning. This we do not possess. It is also interesting and relevant to discuss in what manner the United States could benefit from a resumption of the testing operations. We can answer this very much more fully. Apart from the inherent interest of this question, it may also throw some light—by the way of analogy—on the possible advantage which the Russians may derive from further test operations. Progress on their side might be directed toward different goals. These goals could be as significant, however, as are those connected with American developments. Therefore, the following discussion has a double purpose. It demonstrates concretely the advantage we can derive from continued testing. It also demonstrates by way of analogy that the Russians could make decisive one-sided progress if we agreed to an unenforceable test ban.

It will help in a minor way to clarify our ideas if we recognize that the expression "nuclear testing" is a misnomer. The idea of a test is to check a device whose functioning you already know rather accurately. You may test a car and find out whether it gives 23 or 25 miles per gallon.

In the program of developing nuclear explosives, we are not concerned with tests of this type. Each nuclear explosion is, in fact, an experiment whose outcome is very much in doubt. Sometimes the explosive performs much better than we expect. On other occasions the performance is disappointing; sometimes it is a fizzle. We have learned at least as much from the failures as from the successes. The experiment would not be worthwhile if we knew the outcome in advance.

The aim of this experimentation with nuclear explosives is a continued and rapid advance. This advance actually has been both impressive and continuous. It has produced its important results not by unexpected jumps but by steady and rapid improvement based on ever increasing understanding. Each of the experiments has been in fact accompanied by complex and intricate measurements which have allowed us to find out not only the energy released in the explosion but the particular way in which each portion of the apparatus functioned.

The picture which has been created in the popular mind is quite different from this. It is believed that in 1945 we found the secret of the atom bomb; in the early 1950's we developed the hydrogen bomb; and this ends the story. It is important to emphasize that this picture is false. In fact, each year has added its discoveries, and it is the cumulative results which have produced the present situation. It is accurate to state that, in comparison with the nuclear weapons of 1960, those of 1950 appear completely obsolete. If the development should continue, there is no doubt that in 1970 nuclear explosives can be produced compared to which our present weapons will appear similarly outdated.

Most people believe that any such further development in nuclear weapons is of no importance. It is the general opinion that we have reached a state of saturation. We have enough weapons to destroy the world. Why should we want more? Indeed, we do have enough weapons to destroy the world if we strike the first blow. But this we do not intend to do. In fact, we should make very sure that we shall never do this nor be tempted to do it. If, on the other hand, our nuclear weapons are to survive a Soviet attack and be available for retaliation, then it is questionable whether we have the right kind of weapons to perform this task. Similarly, if nuclear weapons are to be developed into discriminating instruments of tactical warfare, much remains to be done.

The idea of massive retaliation is impractical and immoral. It has caused considerable damage to our position in the world. We have announced that an infraction of the peace, even if it were not a major infraction, might give us cause to strike back at Russia with devastating weapons. Such an action, which responds to evil with much greater evil, is contrary to our sense of justice. We did not put this policy into execution. I doubt whether we ever seriously intended to do so. Today we know that an all-out attack by us will be followed by an all-out attack from the Russians, and this will devastate our own country. It is a certainty that we shall never engage in such folly. The only result of the doctrine of massive retaliation was this: it created a militaristic picture of the United

States. This picture is false. It has never had any validity. Unfortunately, it has appeared credible to many people abroad.

It is my opinion that we must not use our all-out striking power except to deter a massive blow upon the United States itself. This, however, requires that we establish what is called a second-strike force—a force which can inflict upon an aggressor intolerable destruction even after we have been attacked ourselves. If we are in the possession of such a second-strike force, we need not have a nervous trigger finger. We need not unleash our retaliation prematurely because we know that our ability to retaliate will not be destroyed.

Such a second-strike force can be created with the help of our present nuclear stockpile. However, this will be exceedingly expensive. It will cost many billions of dollars. By further nuclear testing we can reduce the weight of our nuclear explosives. This will result in smaller and more mobile missiles. The final effect will be that a second-strike force will cost a fraction of what we would have to spend for it today. Thus, a test ban will not reduce the cost of armaments. It will do the opposite: it will force us into a much more expensive program.

Limited Nuclear Warfare

Massive retaliation has appeared to have one justification. It provides a shield over our allies. If we drop the idea of massive retaliation, it is necessary to find another counter-move to deter Russian nibbling. Today the Communists enjoy great military advantage: central location, superiority in massive conventional weapons and in manpower, and, finally, a political orientation which permits them to assume the initiative without any moral scruples. If we do not want the free world to succumb to piecemeal aggression, we must find a way in which these advantages can be counterbalanced.

Tactical nuclear weapons could enable us to build up a counterforce which would neutralize these Soviet advantages. Nuclear warfare makes it both necessary and possible to employ widely dispersed forces. In fact, concentration of forces in a nuclear war becomes quite impractical. At the same time light tactical nuclear weapons can be carried by small commando-type forces. These small forces are therefore in possession of very great firepower and they can accomplish the same purposes for which in previous wars we had to employ numerous troops.

It is by no means claimed that the use of tactical nuclear weapons will insure victory for our side. There can be little doubt that the Russians possess such weapons also. But, it is claimed that these small nuclear weapons will neutralize the Russian advantages of central location, massive conventional manpower, and surprise. The great power and mobility of the new weapons can be used to regain an equal chance in a limited conflict.

One can go a step beyond this point. With the help of nuclear weapons we can impose the need for extreme dispersion on the armies of an aggressor. In this way the invader will become vulnerable to guerrilla tactics. Thus, we give a chance to any determined people to defend themselves if they want to do so.

But, can any nuclear war remain limited? The opposite has been asserted so often that by mere repetition it has almost assumed the status of a self-evident doctrine. Once small tactical nuclear weapons are employed—so the argument goes—the way is open for the employment of progressively bigger explosions. Eventually all-out nuclear war will follow.

The natural limitation of a nuclear war does not consist in limiting the size of nuclear explosions. The main point should be to limit the aims of the conflict and also its areas. This is the classical method by which wars have been limited in the past. In a limited conflict one should use nuclear weapons of such a size as best serves the military purpose of that conflict. In most cases the targets in a limited war will not warrant the use of big nuclear explosions. It is also most doubtful that the bombing of cities will help to win a limited war. I certainly do not consider such an employment of nuclear weapons to be helpful to our side, and I doubt that it will be considered advantageous by the Russians.

I can see no clear-cut reason why a limited nuclear war should necessarily grow into an all-out war. The assertion of this necessity is merely the Russians' way of advancing the threat of a massive retaliation. They know very well that the employment of tactical nuclear weapons would be to our great advantage. They try to use every possible means of dissuading us from using them. They are doing it more subtly by stating that all-out war is a necessary result of any use of nuclear weapons rather than by stating that all-out war will be started by their side as a measure of retaliation.

All-out war will never be in our interest, and we should never start it. If the Russians should want to embark on such a desperate enterprise, they will probably pick a time when our guard is down.

While a limited nuclear war is in progress, we shall be much better prepared than in times of peace. The time of a limited nuclear conflict, therefore, would be the worst time for the Russians to launch an all-out attack.

It is my belief that limited nuclear warfare can very well stay limited. In fact, during the course of such a war danger of an all-out war will be at a minimum. Preparation for limited nuclear war is desperately needed if we are to maintain the power to defend our allies.

For all of these reasons it is necessary to continue the development of light, cheap, and flexible tactical weapons. We are at the early stages of such a development. The most important nuclear experimentations which have to accompany this development are explosions below one kiloton. During our last nuclear test series such small explosions gained a rapidly increasing importance. It is precisely these small explosions which are hardest to detect. In fact, there does not exist any realistic prospect of working out reliable detection methods, no matter how far into the future we may look.

The Principle of Openness

Toward the end of World War II and in the years following Hiroshima and Nagasaki, Niels Bohr suggested a method of dealing with the problem of nuclear arms. The suggestion was clear-cut and radical. Its central part was to abandon secrecy. He strongly advocated that we return to the free discussion of discoveries and ideas which were characteristic of scientific work before World War II.

It is obvious that if freedom of information were fully established throughout the world all arms-control problems would at once become much more manageable. It would be necessary to bring about the situation where the freedom to exchange information would be guaranteed by enforceable international law. Under such conditions it would become extremely difficult to keep the development of new weapons secret, whether the development were to be pursued by testing or by other procedures. The production and deployment of weapons might become known at the same time.

Of course, this proposal could not become a reality except by a very thorough change of the world as we know it today. It would effectively mean that Russia would have to cease to be a police state. Police states cannot flourish in the full light of world publicity. Thereby a reason and perhaps the major reason of world tension would have disappeared. The possibility of arms control would become only one facet of a situation that appears to us now too wonderful to be realistic.

Nevertheless, I believe that Niels Bohr's suggestion deserves serious consideration. It strikes at the root of our difficulties. It stresses that kind of openness which is natural in free countries and which has been the lifeblood of science. In this connection, Bernhard G. Bechhoefer has pointed out to me the provision contained in Article VIII B of the Statute of the International Atomic Energy Agency. Article VIII, Sections A and B read as follows:

> Each member should make available such information as would, in the judgment of the member, be helpful to the Agency.
>
> Each member shall make available to the Agency all scientific information developed as a result of assistance extended by the Agency pursuant to article XI.

Mr. Bechhoefer adds that these provisions should be interpreted in conjunction with Article VII, paragraph F, which requires that the members of the Secretariat "shall not disclose any industrial secret or other confidential information coming to their knowledge by reason of their official duties for the Agency." What this means is that any States securing assistance—material or otherwise—from the Agency have a fairly extensive obligation to disclose their entire Atomic Energy programs; States not calling for Agency assistance—which would include the United States and the Soviet Union—have a far less extensive obligation.

The background and interpretation of these provisions are set forth in the recently published volume entitled, *Atoms and the Law* (University of Michigan, 1959), pages 1375-1376. This particular section, entitled "Atoms for Peace—The New International Atomic Energy Agency," was written by Eric Stein and Bernhard G. Bechhoefer.

At the same time there is no doubt that serious problems will be raised. Can we abandon secrecy in the present state of affairs? Will such a plan not endanger our military safety? Is it not true that openness will accelerate the spread of nuclear weapons among other nations? These questions merit thought. In my opinion they point to the fact that a sudden and sweeping abandonment of secrecy on the part of the United States should not be proposed. But in order to obtain a sense of balance we should investigate the possible answers to the questions mentioned above.

Secrecy has not prevented our most powerful enemy from developing the most powerful weapons we possess. It is not even obvious that our secrecy measures have slowed down Soviet progress. It is quite obvious, however, that secrecy has impeded our own work. Because of secrecy we have had to limit the number of people who could contribute to the development of our own weapons. Due to secrecy it has become difficult to exchange information with our allies. This led to duplication. It has also led to a less than complete realism in the planning of our common defense. Secrecy has also prevented full public discussion of the possibilities of the future development of our weapons. The fact that most of our fellow citizens consider nuclear explosives as weapons of terror rather than of defense may be due to a considerable extent to secrecy. This is only one face of the more general truth that the democratic process does not function well in an atmosphere of secrecy.

It cannot be denied that the full publication of all nuclear facts will aid further nations in developing nuclear explosives. However, the gradual spread of this knowledge is unavoidable. It has been stated above that the main limitation is the absence of nuclear materials rather than the absence of knowledge. If we can guarantee a completely open flow of information, it will become much easier to check the production of nuclear materials. In the long run this will more than offset the dangers introduced by publishing the facts about nuclear explosions.

It seems to me, therefore, that we should give most serious thought to a gradual and well-planned abandonment of all secrecy concerning technical and scientific facts. We should at the same time exert as much pressure as we possibly can on every nation in the world that they likewise permit complete freedom for the flow of information. At the present time some technical facts are subject to secrecy in many nations. We should try by every means to reverse this trend toward secrecy. Every additional secret is an obstacle to the free collaboration and the eventual union of nations. A strong and widespread condemnation of all practices of secrecy may in the long run have a strong effect even on those countries which value this form of security most. Direct influence upon the Soviet government is not likely to produce quick results. Individual Russians and particularly Russian scientists are likely to be susceptible to an approach which stresses openness together with collaboration and increasing mutual confidence. In this way we shall put ourselves in the position in which the obvious advantages of a free democracy will have the greatest effect. Instead of more restrictions and more suspicions, we shall create more freedom and more trust.

If we make progress along these lines, we may well find that arms control will become feasible. It will then become an academic question whether arms control has brought about more stability or whether greater stability has made arms control possible. The two will go hand in hand and will reinforce each other.

Insuring Peace

One can look at the problem of peace from an even more general point of view. Science and technology have made the world small. Our interrelated problems can no longer be solved on a narrow national basis. The present administration has stressed this fact and has tried to proceed along the road of creating a lawful family of nations.

The need for supranational organizations is most obvious when we try to find ways by which to avoid war. But it is not only through common dangers that we are closely tied to our neighbors. Big-scale enterprises like the exploitation of atomic energy, the prediction and the eventual modification of weather, the study and cultivation of the oceans are all undertakings which are best carried forward on an international scale. It is hardly possible to do otherwise.

These positive undertakings can most easily furnish the first steps toward peace. Work toward a mutually desirable aim brings about the type of collaboration whereby no secrecy or suspicion can arise. Work along such lines can lay the foundation of friendships, and success will give the feeling of a common accomplishment on which future extended cooperation can be based.

One feeble attempt in this direction was the international geophysical year. It was a wonderful undertaking. It is a pity that it was limited to a "year" which lasted for only eighteen short months.

To state that international cooperation is difficult is to state the obvious. But we should use all possible ingenuity and determination to overcome this difficulty. We may start by close and meaningful cooperation with the NATO countries. At the same time we should work together with as many further nations as possible on projects which at first may have to be limited. Would not a yearly amount of a billion dollars be well spent on such international enterprises? Every common undertaking will help in the difficult long-range task of establishing a stable world organization which commands the loyalty of all people.

Our problem is how to insure peace and how to create a lawful world. It has been argued that only arms control can bring about a rapid solution. It is true that the more ambitious developments which I am advocating here will take a longer time. It is necessary, however, to consider this question: is the proposed quick solution a solution at all? Is it even a step in the right direction? I believe that the road through a comprehensive and responsible world organization is longer and harder; but it is the only one that is realistic and that promises eventual success.

HENRY A. KISSINGER

Limited War: Conventional or Nuclear? A Reappraisal

The Nature of the Debate

FEW ISSUES have aroused more controversy than the relative role of conventional and nuclear weapons in Western strategy. Its resolution is of vital significance for our strategy, our policy in alliances, and the future of arms-control negotiations.

Two facts need to be understood at the outset: no war in the nuclear age can ever be completely free of the specter of nuclear weapons—at least, not until arms-control measures are much further advanced and much more reliable. In a war between nuclear powers, even if no nuclear weapons are used, both sides would have to take account of the possibility that they *might* be. The tactics would necessarily differ from those of World War II; deployment would have to guard against the sudden introduction of nuclear weapons. Diplomats would have to negotiate with the knowledge that any prolonged conventional war may turn into a nuclear conflict, if not a final show-down. Every war henceforth will be nuclear to a greater or lesser extent, whether or not nuclear weapons are used.

A second fact is equally important: the choice between using conventional or nuclear weapons is no longer entirely up to us. The Soviet nuclear arsenal is growing. Soviet military journals report tactical exercises with nuclear weapons. We cannot gear our strategy or stake our survival on the assumption that nuclear weapons will *not* be used against us. Even if we prefer to resist with conventional weapons, we have to be prepared for nuclear war as well. Only our being ready for limited (in addition to general) nuclear war will give us the option of a conventional strategy.

Based on a chapter from the author's forthcoming book, *The Necessity for Choice: Prospects of American Foreign Policy* (New York: Harper & Brothers in press).

Arguments for a Nuclear Strategy

With this background, we can summarize the arguments for both sides. The advocates of a nuclear strategy—a strategy of initiating the use of nuclear weapons in limited war—emphasize the disparity in mobilizable manpower between the Communist bloc and the free world, a disparity made even more acute by the Communist ability to concentrate their whole weight against states much smaller and much less well-equipped. Nuclear weapons, it is claimed, can serve as a substitute for manpower. At the very least, they will force an aggressor to disperse his forces and prevent breakthroughs of established defensive positions and the consolidation of occupied territory.

The proponents of a nuclear strategy admit that if nuclear weapons were simply added to the tactics of World War II the result would probably be the complete devastation of the combat zone. They point out that such a course would be senseless. The cost of a nuclear strategy must be judged in terms of the tactics appropriate to nuclear weapons. Since nuclear weapons are so destructive and at the same time so easy to transport, large military formations cannot be maintained in the field. And they are unnecessary because fire power is no longer dependent on massed armies. To concentrate is to court disaster. Safety resides in mobility. Logistics must be simple. The traditional supply system is too cumbersome and too vulnerable. Accordingly, a great premium will be placed on small, self-contained units of high mobility. In such circumstances, it is argued, damage would not be excessive; indeed it might be less than that of a conventional war of the World War II variety with a flankless front line rolling over the countryside.

A nuclear strategy according to its proponents would have these advantages. (a) The dispersal of troops would separate the requirements of victory from those of controlling territory. To prevail in a nuclear war, it is necessary to have small, highly mobile units. To control territory, larger concentrations are required, particularly in the key centers of administration. For example, the Soviet army required some twenty divisions to crush the Hungarian rebellion. Crushing the rebellion, it is argued, would have been clearly impossible if the Soviets had had to face nuclear weapons. (b) Nuclear war would complicate the aggressor's calculations—if only because it is an unfamiliar mode of warfare. The Soviet Union and Communist China possess many "experts" in conventional warfare; but with respect to nuclear war, the calculations are theoretical. There would always remain the inevitable uncertainty of embarking on a course in which no experience is available. (c) Nuclear war would be an effective device to weaken the Communist control of Soviet dominated areas. The small detachments that are appropriate for nuclear war will be extremely vulnerable to guerilla activity and can be handicapped severely by a hostile population. Since the population on the Western side of the Iron Curtain is more loyal to its governments than are those under Communist rule, a nuclear war is thought to be the best means of exploiting Soviet political difficulties—at least, in Europe—and therefore the most effective means of deterring Soviet aggression. (d) Nuclear weapons are our "best weapons," the result of our most advanced technology. To forego using them is to deprive ourselves of the advantages of a superior industrial potential. (e) Any other course would impose impossible force requirements. It is admittedly impossible to fight a conventional war against a nuclear enemy without having a nuclear establishment in the field—otherwise, the temptation for the aggressor to use nuclear weapons and sweep all before him might become overwhelming. This means that we would need a well-protected retaliatory force, a capable limited war force, and increasing conventional strength. Since the expense of maintaining each category even at present levels is multiplying, and since the military budget is shrinking, any attempt to build up conventional forces must result in a fundamental, perhaps fatal, weakness in each category.*

The Arguments for a Conventional Strategy

The advocates of a conventional strategy reply that the decision to use nuclear weapons is inconsistent with the very concept of limitation. Pointing to such military exercises with nuclear weapons as "Carte Blanche" in Europe and "Sagebrush" in the United States, they stress that the inevitable consequence of nuclear war will be the desolation of the combat zone and the decimation of the population. No country would wish to be defended at that price. Even a "successful" nuclear war would provide a conclusive argument for future Soviet blackmail.

Moreover, once nuclear weapons are used, so this school of thought reasons, all restraints may disappear. It will be difficult enough to establish the limits of a conventional war. Because of their very unfamiliarity, nuclear weapons would make the task nearly impossible. The very fact that there exists a continuous spectrum of destructiveness in nuclear weapons, so often invoked by advocates of a nuclear strategy in defense of their thesis, is used by their critics against them. If the distinction between the low-yield and high-yield weapons is so difficult, if so much depends on the manner of employing them, any effort to set limits based on explosive equivalent will be meaningless. The temptation to resort to even more destructive weapons will be overwhelming.

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* For a fuller discussion of limited nuclear war, see the author's *Nuclear Weapons and Foreign Policy* (New York, Harper & Brothers, 1957), ch. VI, "Problems of Limited Nuclear War," pp. 191 ff.

Proponents of a conventional strategy question not only the possibility of limitation but also the efficacy of the tactics thought to be appropriate for nuclear war. Small detachments, they contend, whatever their nuclear fire power, would be extremely vulnerable to harassment and defeat by conventional forces. When confronted by an opponent possessing both a nuclear and a conventional capability, they are almost certain to lose, for they would be largely defenseless against small conventional raiding parties. Nuclear weapons, it is contended, are not a substitute for manpower. On the contrary, because of its high rate of attrition, nuclear war would probably require more manpower, not less.

Finally, our industrial potential will be less significant in a nuclear war. Since nuclear weapons provide greater destructiveness per unit cost than do conventional explosives, reliance on them enables economically weaker nations to redress the strategic balance much more easily than they could with conventional forces. A point is likely to be reached for any given objective or area at which additional increments of explosive power are no longer strategically significant. When this "saturation point" is reached, superiority in nuclear weapons may be meaningless. And nuclear weapons place a premium on surprise attack and sudden thrusts to which the defender is much more vulnerable than the attacker. To rely on a nuclear strategy, it is urged, would thus be adopting a course of conduct which rewards the qualities in which potential aggressors excel.

A conventional strategy according to its advocates would have these advantages. (1) It would provide the best chance to limit any conflict that might break out. (2) It would use our industrial potential to best advantage. Since the destructive power of individual conventional weapons is relatively low, victory can be achieved only through a substantial production effort which puts a premium on our special skills. At the same time, the relatively slow pace of military operations—at least, as compared to nuclear war—and the need to build up supplies before such a new advance give the maximum opportunity for attempting a political settlement. (3) Conventional defense provides the best means of preventing the occupation of threatened countries. The concept of a flankless line which advocates of a nuclear strategy wish to abandon is likely to be considered by threatened countries as the best guarantee of their safety. Liberation will always be a less attractive prospect than protection. (4) If, after all, nuclear weapons were used, the onus of initiating such a war would be shifted to the Communist states.

Deterrence vs. Conduct of the War

One of the difficulties in resolving these arguments is that the moral fervor of the debaters sometimes obscures the nature of the issues and often causes them to claim too much: those who think that to forego nuclear weapons is an offense against progress have as their counterpart those who are passionately convinced that even to consider modalities of nuclear warfare is to insult morality. As a result, arguments that closer examination would reveal at least as imprecise and sometimes as erroneous have been elevated into dogma.

For example, it is often said that a nuclear war cannot be limited because neither side would accept defeat without resorting to even larger weapons. Now there are many good reasons for concern about the possibility of limiting nuclear war. But the argument that neither side will be prepared to accept a setback implies that it is somehow worse to be defeated in nuclear than in conventional war. In reality, it seems much more likely that the decision as to whether a war is to be expanded depends more on the value attached to the objective than to the weapons used to attain it. It is not clear why a country should be more willing to acquiesce in a conventional than in a nuclear defeat. Whatever the technical difficulties of limiting nuclear war, the political argument that it makes defeat unacceptable does not bear scrutiny.

On the other side of the debate a nuclear strategy is often justified by the spectrum of available weapons. The smallest nuclear weapons, it is said, are less destructive than the most powerful conventional devices. There is therefore no technical reason to recoil before nuclear warfare, and every reason to use our most "advanced" technology. However, the effort to base a nuclear strategy on the discrimination of nuclear weapons surely goes too far. The chief motive for using them is, after all, their greater destructive power and their lower weight per explosive equivalent. Nuclear weapons no more destructive than conventional ones would probably not be worth the increased risk of "escalation" inherent in an unfamiliar mode of warfare.

The frustration in the debate is all too often caused by the fact that both the proponents and the opponents of a nuclear strategy are right: their disagreements arise from the perspective from which they consider the issue. Looking at the problem from the point of view of deterrence, the advocates of a nuclear strategy argue that nuclear weapons are the most effective sanction against the outbreak of a war. Considering the actual conduct of a war, the opponents of a nuclear strategy are above all concerned with reducing the impact of military operations and increasing their predictability. The destructiveness of individual weapons and the uncertainties of an unfamiliar mode of warfare which are correctly adduced as contributing to deterrence can, with equal justification, be cited as working against effective limitation.

Much of the debate therefore turns on the question of what should be stressed: deterrence or the strategy for fighting the war. Obviously, an overemphasis on destructiveness may paralyze the will. But an overconcern with developing a tolerable strategy for the conduct of war may also reduce the risks of aggression to such a degree that it will be encouraged. While the deterrent threat must be credible, the quest for credibility must not lower the penalties to a point at which they are no longer unacceptable. The frequency of warfare since the Middle Ages demonstrates the difficulty of achieving deterrence with conventional weapons alone. On the other hand, a course of action that increases the opponent's uncertainties about the nature of the conflict will generally discourage aggression. If war should break out, however, through accident or miscalculation, it may make limitation extremely difficult.

Direction for United States Strategy

Some years ago this author advocated a nuclear strategy.* It seemed then that the most effective deterrent to any substantial Sino-Soviet aggression was the knowledge that the United States would employ nuclear weapons from the very outset. A nuclear strategy appeared to offer the best prospect of offsetting Sino-Soviet manpower and of using our superior industrial capacity to best advantage.

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* See *Nuclear Weapons . . .*, pp. 174 ff.

The need for forces capable of fighting limited nuclear war still exists. However, several developments have caused a shift in my view about the relative emphasis to be given conventional forces as against nuclear forces. These are: (1) the disagreement within our military establishment and within the alliance about the nature of limited nuclear war; (2) the growth of the Soviet nuclear stockpile and the increased significance of long-range missiles; (3) the impact of arms-control negotiations. The first of these considerations raises doubts as to whether we would know how to limit nuclear war. The second alters the strategic significance of nuclear war. The third influences the framework in which any strategy will have to be conducted and determines the political cost.

While it is feasible to design a theoretical model for limited nuclear war, the fact remains that fifteen years after the beginning of the nuclear age no such model has ever achieved general agreement. It would be next to impossible to obtain from our military establishment a coherent description of what is understood by "limited nuclear war." The Air Force thinks of it as control over a defined air space. The Army considers it vital to destroy tactical targets which can affect ground operations, including centers of communications. The Navy is primarily concerned with eliminating port installations. Even within a given service, a detailed, coherent doctrine is often lacking. The Strategic Air Command and the Tactical Air Force almost surely interpret the nature of limited nuclear war differently. Since disputes about targets are usually settled by addition—by permitting each service to destroy what it considers essential to its mission—a limited nuclear war fought in this manner may well become indistinguishable from all-out war. At least, it would diminish our assurance and subtlety in an operation in which everything would depend on the ability to remain in control of events.

The disagreements between our services are repeated in relations with our allies. Few of our allies possess nuclear weapons. Those that do have emphasized the retaliatory and not the tactical aspect of nuclear warfare. Public opinion in most allied countries has been mobilized against nuclear weapons by a variety of agents. And these attitudes are reinforced by current trends in arms-control negotiations. In these circumstances, it will become increasingly difficult to concert a strategic and tactical doctrine that is accepted by the alliance and maintained with conviction in the face of Soviet pressure. This raises doubt as to whether the West will possess either the knowledge or the daring to impose limitations. If it relies *entirely* on a nuclear strategy, its vulnerability to nuclear blackmail both before and during hostilities would be considerable.

To be sure, any limitation of war is to some extent arbitrary. There is probably some disagreement even as to the nature of limited conventional war. The problem of communicating intentions to an opponent during a conflict will be difficult regardless of the mode of warfare, but this makes it all the more important that the limitations which are attempted be reasonably familiar. Even with the best intentions on both sides, a nuclear war will be more difficult to limit than a conventional one. Since no country has had any experience with the tactical use of nuclear weapons, the possibility of miscalculation is considerable. The temptation to use the same target system as for conventional war and thereby produce vast casualties will be overwhelming. The pace of operations may outstrip the possibilities of negotiation. Both sides would be operating in the dark with no precedents to guide them and a necessarily inadequate understanding of the purposes of the opponent, if not their own. The dividing line between conventional and nuclear weapons is more familiar and therefore easier to maintain—assuming the will to do so—than any distinction within the spectrum of nuclear weapons. This uncertainty may increase deterrence. It will also magnify the risks of conflict should deterrence fail.

These considerations are reinforced by the strategic changes wrought by the advent of the age of nuclear plenty and the long-range missile. When nuclear material was relatively scarce, it was possible to believe that tactical nuclear weapons might give the West an advantage in limited war. Under conditions of nuclear scarcity, the Soviet Union would have had to make a choice: it could not simultaneously push the development of its retaliatory force and also equip its ground forces for nuclear war. Whatever alternative was chosen would produce a weakness in *some* category. Since the logical decision for the Soviets was to give priority to the retaliatory force, it was then held that tactical nuclear weapons could be used to offset Soviet conventional preponderance.

In the meantime, the Soviet nuclear stockpile has multiplied. A nuclear strategy will now have to be conducted against an equally well-equipped opponent. In these circumstances, numbers become again important. Because of the destructiveness of nuclear weapons, the casualty rate among combat units is likely to be high. The side which has the more replacements available therefore stands to gain the upper hand. The notion that nuclear weapons can substitute for numerical inferiority has lost a great deal of its validity.

The development of missiles has accentuated the strategic problems of limited nuclear war. As long as delivery systems were composed of airplanes, air domination over the battle area on the model of our experience in the Korean war was conceivable. And tactical skill in handling the weapons *within* the combat zone might lead to victory on the nuclear battlefield. However, as missile forces grow on both sides, as even airplanes are equipped with medium-range missiles, this possibility steadily diminishes. For one thing, it seems unnesessary to introduce major nuclear forces into the combat zone, since nuclear weapons can be delivered accurately at considerable distances. More importantly, the only way of achieving what used to be considered air superiority is to destroy most of the opponent's medium- and intermediate-range missiles. Such an operation is difficult to reconcile with an attempt to limit hostilities. If, however, the areas where these missiles are located become sanctuaries, it would appear that a stalemate is almost inevitably the outcome of a limited nuclear war.

Of course, such a result must not be minimized. An aggressor, certain that his attack would be checked, would presumably be deterred. The difficulty is the devastation of the combat zone, which would be the price of a stalemate. In some situations, it may be to the Communist advantage to settle for the *status quo ante* in a war that obliterates the disputed area. If a Soviet attack on Western Germany should lead to the desolation of the Federal Republic, the Soviet Union would score a major gain even if it offered at some point to withdraw to its starting point. The devastation of Germany might be a means of convincing all other threatened areas of the futility of resistance. An "unsuccessful" attack of this nature might insure the success of all future Soviet blackmail.

Finally, it would be idle to discount the impact on strategy of the pattern of arms-control negotiations. At each conference, nuclear weapons have been placed in a separate category and stigmatized as weapons of mass destruction without any distinction as to type or device. The goal of eventual nuclear disarmament has been avowed by all states. A moratorium of nuclear testing has been in existence for two years, and it is probable that a formal agreement will be signed. Future negotiations will almost inevitably reinforce this trend. The consequence will be that the inhibitions against using the weapons around which the West has built its whole military policy will multiply. Whatever the other consequences of a nuclear-test ban, it will reinforce the already strong reluctance to use nuclear weapons in limited war.

These factors will create an extremely precarious situation if the free world continues to rely primarily on a nuclear strategy. The more the pressures build up against *any* use of nuclear weapons, the greater will be the gap between our deterrent policy, our military capability and our psychological readiness—a gap which must tempt aggression. The years ahead must therefore see a substantial strengthening of the conventional forces of the free world. If strong enough to halt Soviet conventional attacks—as in many areas such as Europe they could be—conventional forces would shift the onus and risk of initiating nuclear war to the other side. Even where they cannot resist every scale of attack, they should force the aggressor into military operations which leave no doubt as to his ultimate aim. They would thereby make an ultimate recourse to nuclear weapons politically and psychologically simpler, while affording an opportunity for a settlement before this step is taken.

Many of the assumptions regarding the impossibility of conventional defense and of "hordes" of Communist manpower are either fallacious or exaggerated. Both in total available manpower and in its industrial potential, the free world still is superior. And conventional warfare favors the defense. It has been truly remarked that but for the development of nuclear weapons, the defense would long since have achieved ascendancy over the offense. Even in World War II, the attacker generally required a superiority of three to one.

To be sure, in other areas the problem is more complicated. In the so-called "gray areas" of the Middle East and Southeast Asia, the Communist bloc can concentrate its manpower and material against countries weaker and less closely allied than are those of the North Atlantic Community. On the other hand, these are also the areas where the political penalties for aggression would be the greatest. An attack on an emergent country would antagonize all the other uncommitted nations and would lead to an increased mobilization of Western resources. Moreover, difficulties of terrain and communications place a ceiling on the number of troops an aggressor could effectively utilize even there. The inability to protect every area locally is no excuse, nor is failing to secure those areas where protection is possible.

At a minimum, the conventional capability of the free world should be of such a size that a nuclear defense becomes the *last* and not the *only* recourse. The best situation is one in which the conventional forces of the free world can be overcome *only* by nuclear weapons. There is no technical reason why this should not be possible, in Western Europe, at least. Such forces would remove many opportunities for Soviet gains achieved merely by the use of threats. They would increase the flexibility of our diplomacy. They would enable us to negotiate the control of nuclear weapons with confidence.

Some Consequences

While a substantial build-up of conventional forces and a greater reliance on a conventional strategy is essential, it is equally vital not to press the conclusions too far. In their attempt to prove their case, many of the proponents of a conventional strategy have thought it necessary so to deride *any* reliance on nuclear weapons, or to paint so awful a picture of atomic war that they may defeat their own object. For, against an opponent known to consider nuclear war as the worst evil, nuclear blackmail is an almost fool-proof strategy. Conventional forces will be of no avail if an aggressor is convinced that he can probably force surrender by threatening to use nuclear weapons. A greater emphasis on conventional defense presupposes that the aggressor cannot promise himself an advantage either from the threat or the actuality of nuclear war. However much conventional war may be preferred to the use of nuclear weapons, limited nuclear war is preferable to all-out war.

Conventional forces should not be considered a substitute for a capability of waging a limited nuclear war, but a complement to it. It would be suicidal to rely entirely on conventional arms against an opponent equipped with nuclear weapons. Such a development would probably provide the precise incentive an aggressor needs to employ nuclear weapons and to sweep all before him. A conventional war can be kept within limits only if nuclear war seems more unattractive.

This becomes apparent when we analyze what options we have if, despite our best efforts in the conventional field, nuclear weapons are actually used against us. We would then seem to have three choices: to accept defeat; to resort to general war; or to seek to conduct limited nuclear war. If we are unwilling to accept defeat—and to do so under such circumstances would make us forever subject to nuclear blackmail—our choice resolves itself into all-out war or limited nuclear war. All-out war will become increasingly senseless as the missile age develops. Hence, conventional war can be kept conventional only if we maintain, together with our retaliatory force, an adequate capability for limited nuclear war. The aggressor must understand that we are in a position to match any increment of force, nuclear or conventional, that he may add. This realization would reduce the incentive to engage in aggression, and should deterrence fail, it will provide the best chance of limiting hostilities.

It may be argued that this line of reasoning demonstrates the absurdity of a greater reliance on conventional weapons. Nuclear weapons must favor one side or the other. If they favor us, we should use them. If they give an advantage to the Communists, they will use them. But this is not necessarily the case. Unless the superiority of one side grows overwhelmingly, the increased risks of an unfamiliar mode of warfare may outweigh the purely military benefits.

The relation between conventional and nuclear capabilities is subtle and complex. If we are serious about placing a greater reliance on conventional forces, we must reassess a notion which has become almost axiomatic in our military establishment: that our military forces can be equipped and trained as dual-purpose units capable of fighting both nuclear and conventional war. This concept has merit as regards the Navy and the Air Force—or any other unit not in constant contact with the opponent and therefore subject to more or less continuous control from higher levels. But it is fallacious with respect to ground operations. To be sure, troops can be trained to use both nuclear and conventional weapons. They should at least be aware of the elementary forms of protection against nuclear attack. But once committed to combat, the units actually engaged in military operations must opt for one mode of warfare or another. For one thing, it is probably impossible to shift from conventional to nuclear war at the opponent's initiative. The side using nuclear weapons first can disperse, while the side relying on conventional weapons must remain concentrated in order to have the necessary fire power. The front-line units of the side conceding the first nuclear blow will almost certainly suffer heavily should the war turn nuclear. Their protection is not so much nuclear weapons of their own as to have *available* within striking distance *other* units capable of conducting nuclear operations.

If nuclear weapons become an integral part of the equipment of *every* unit, it will be next to impossible to keep a war conventional, regardless of the intentions of both sides. Even if the intention is to employ nuclear weapons only as a last resort, this becomes empty when the interpretation of this step becomes more and more decentralized. A regimental or even a divisional commander should not be the judge. Lacking the over-all picture, he will always be tempted to utilize all his available weapons. When he is hard-pressed, it would require superhuman discipline not to use arms which he believes may solve his difficulties. And the further down a unit is in the chain of command, the less can its experience be taken as a guide to the general situation. Regiments or divisions have been destroyed even in the midst of an over-all victory.

While a great deal of attention has been given to the diffusion of nuclear weapons to new countries, the diffusion downward of nuclear weapons *within* our military establishment is also a cause for concern. The more foci of control, the greater the possibility that these weapons will be used—not so much by the action of the "mad" major of the horror stories of accidental war as by the best judgment of a hard-pressed officer in the confusion of combat. An action which would bespeak our increased emphasis on conventional weapons more convincingly than any declaration would be to create nuclear and conventional commands for purposes of combat. The units could be trained interchangeably. But once committed, the conventional forces would not have nuclear weapons at their direct disposal. Deterrence as well as the conduct of nuclear war would be in the hands of separate commands whose weapons would be made available to the conventional forces only on the basis of an explicit decision at the highest level.

The need for separate commands indicates that a conventional capability cannot possibly be accommodated within present force levels. In the absence of reliable arms control, larger military budgets will almost surely be required. This is a price worth paying. But we should not imagine that the shift to a greater reliance on conventional weapons requires only the decision to do so. It will involve substantial efforts, intellectual and material, and it will be neither cheap nor easy.

It is sometimes argued that a conventional strategy does not necessarily require an increase in conventional forces. Our national history reminds us of many wars where we prevailed, despite initial defeats, because of the might of our industrial potential. An aggressor, so the argument goes, would be more deterred by the possibility that we would build up our strength during a conflict than by the forces-in-being available to us at the beginning. The Korean war is only the latest demonstration of our ability to build up fairly quickly, provided only that we are able to hold the initial thrust of the aggressor for some time.

This view has great merit. Conventional weapons have a relatively low order of destructiveness and yet require a fairly substantial production effort. They therefore do place a premium on the West's industrial potential. At the same time, care must be taken not to draw extreme conclusions from this fact. In both World Wars our side not only had a superior industrial potential but also a vast preponderance of manpower. Nevertheless, victory required a build-up of nearly two years and protracted campaigns whose bloodiness must not be obscured by the horror of nuclear warfare.

Whatever the significance of prolonged mobilization in the era of what is now called conventional technology, it becomes an extremely risky course in the nuclear age. When both sides possess nuclear weapons, there is always the danger that they will be used, regardless of declarations and perhaps even intentions. The risk of "escalation" is a product of two factors: the nature of the limitations and the duration of the conflict. A limited nuclear war lasting one day may involve a smaller danger of "escalation" than a conventional war lasting a year. Aggression may be tempted by the prospect of dramatic victories and the possibility that the free world may not be willing to run the risks of nuclear war inherent in a prolonged mobilization. Forces-in-being are therefore more important than at any previous time in our history. This does not mean that they must be able to hold every square inch of every threatened area. It does indicate that enough of an area must be protected so that the governments concerned consider resistance not simply a quixotic gesture. And the prospect of restoring the situation must be sufficiently imminent so that the aggressor sees no prospect in creating a *fait accompli* and then "out-enduring" his opponents. In short, greater reliance on a conventional strategy implies that we are prepared to maintain conventional forces and mobilizable reserves in a higher state of readiness than ever before. It is as dangerous to think of a conventional strategy as if somehow nuclear weapons could be eliminated from our calculations as it is to continue to consider nuclear weapons from the perspective of our now-ended invulnerability.

These considerations bear importantly on the question of how the decision to place greater reliance on conventional weapons is to be made manifest. Many thoughtful persons have proposed that we should strive in arms-control negotiations to bring about a mutual renunciation of the first use of nuclear weapons. We should, it is urged, resist Communist aggression with conventional forces and resort to nuclear weapons only against nuclear attack. Nothing less, so the argument goes, will induce us to develop the necessary conventional forces and doctrine. It would end the possibility of nuclear blackmail. It would remove the immediate danger of a nuclear holocaust.

There is no doubt that such an agreement has many tempting aspects. It would be a stunning initiative if we proposed a formal agreement to renounce the use of nuclear weapons and perhaps a serious Soviet political setback if it were rejected. It would force us to come to grips with the problems of conventional strategy more urgently than seems otherwise possible. Indeed, *if* a mutual renunciation should be thought desirable, it may well be that a unilateral Western step would be the wisest course. A formal agreement has the advantage that the Soviet Union would have to violate a solemn treaty if it resorted to nuclear weapons or to nuclear blackmail. But this inhibition would hardly be greater than one produced by a unilateral renunciation by the United States. Nuclear blackmail would put an end to our renunciation, and *a fortiori,* so would the first Soviet use of nuclear weapons. In both cases the onus for returning to a reliance on nuclear weapons would be placed on the Soviet Union—within the limits of certainty produced by what will almost surely be a highly ambiguous situation. The slight additional advantage of a formal agreement would be more than made up for by the clarity and initiative achieved by a unilateral declaration.

However, the propagandistic gain does not outweigh the political and strategic disadvantages. A really effective renunciation would imply that either side—or at least the side renouncing nuclear weapons—would prefer to be defeated by conventional weapons rather than employ its nuclear arms. This in itself will be a hard decision to make. Would we be prepared to lose Europe to a conventional attack? If we are not—and we cannot be—a formal renunciation may be meaningless. On the other hand, if the aggressor accepts a renunciation of nuclear weapons at face value as indicating a decision to accept a defeat by conventional forces, aggression may actually be encouraged.

Assuming that it were possible to return to a *pure* conventional strategy—with either side preferring a defeat by conventional weapons to a nuclear war—what would be the consequences? It seems inevitable that deterrence would be weakened. The history of warfare in the conventional era indicates that it is not easy to convince an aggressor of the risks of embarking on war. Because of the relatively low destructiveness of individual weapons, the side which can suddenly mass its forces can usually achieve a breakthrough. The key to success is the ability to concentrate more forces *at any* *given point* than the opponent. In both World Wars, Germany began the war even though it was numerically inferior, relying on tactical skill and mobility. Victory was ultimately achieved only after prolonged and ruinous conflict, which indicated that the certainty of defeat required for deterrence is not easy to obtain with conventional weapons. Arms control can ameliorate this situation, but not eliminate it. Even if forces on both sides are stabilized, it will not be easy to stabilize tactical skill and mobility.

On the historical record, then, conventional weapons are not very effective for deterrence. This situation may even be magnified in the nuclear age. An aggressor may seek to achieve a victory by conventional means and then protect it by nuclear arms. We will then face the dilemma of either accepting the defeat or engaging in a kind of warfare which our renunciation of nuclear weapons was designed to avoid and which seems incapable of depriving the aggressor of his prize. If the Soviet Union should succeed in overrunning Europe or even Iran with conventional forces, it could then offer peace while threatening to resist the restoration of the *status quo ante* with nuclear weapons. It would appear extremely difficult to land on a hostile shoreline or to fight our way across the Continent, say, from Spain, against an opponent prepared to use nuclear weapons. In short, the combination of a conventional strategy for an overwhelming initial victory, coupled with a nuclear strategy to prevent a recapture of lost territories, may be the most effective form of Communist aggression.

All these risks, however, would be run for a gesture which may be meaningless. For, regardless of what we tell the aggressor or even ourselves, we could not guarantee that if pressed too hard we would not use nuclear weapons after all. This uncertainty about whether we "meant" our renunciation or knew our own mind would add to deterrence. It indicates, however, that at best a formal renunciation of the first use of nuclear weapons would not weaken deterrence; at worst it may open a new scope for blackmail.

In the nuclear age, therefore, actions speak louder than words. What we tell the Communist countries is less important in the first instance than what we tell ourselves. We should make immediate and energetic efforts to restore the conventional forces of the free world. We must adjust our doctrine accordingly. But it would be extremely risky to create the impression that we would acquiesce in a conventional defeat in vital areas. Once the conventional balance of forces is restored, we could then responsibly announce that we would employ nuclear weapons only as a last resort, and even then in a manner to minimize damage. To the extent that the Communists are unable to defeat the conventional forces of the free world without resorting to nuclear weapons, the practical effect will be to renounce the first use of nuclear weapons. Even where this is not the case, strengthened conventional forces would pose an increased risk for the aggressor and provide opportunities either for the mobilization of additional conventional forces or for negotiations before we make the decision to use nuclear weapons. The inability to defend every area with conventional forces should not be used as an excuse for failing to build up our strength. The free world must not become a victim of asserting that if it cannot do *everything*, it will not do *anything*.

The course we adopt with respect to the relation between conventional and nuclear strategy will determine the future direction of our strategy as well as our diplomacy. This is particularly evident with respect to arms-control negotiations. In this respect, the present state of our military establishment places us at a severe disadvantage. Given the disparity in Sino-Soviet and Western conventional forces, many measures such as a percentage reduction of forces or a troop freeze may be a means of perpetuating an inequality which will be an increasing source of danger as all-out war becomes more and more senseless. The same effect will be produced by our concentrating on nuclear disarmament without addressing ourselves to the gap in conventional forces. We can escape this vicious circle only if we realize that the price of flexibility is sacrifice and effort. If our military establishment continues to be built around nuclear weapons, and if we refuse to make the sacrifices involved in a greater reliance on conventional weapons, the current emphasis of arms-control negotiations must be shifted. In such circumstances, it will not be wise to lump all nuclear weapons into a separate category of special horror. Rather, we should then elaborate as many distinctions between various types of uses and explosive power as possible in order to mitigate the consequences of a nuclear war. On the other hand, if we really believe in the need for a greater emphasis on conventional weapons, we must be prepared to accept the paradox that the best road to nuclear-arms control may be conventional rearmament.

This is not to say that arms control should be reserved for the nuclear field. On the contrary, the balance in conventional forces should be based on a combination of an increase of our conventional strength and control schemes to stabilize an agreed level of forces. But we cannot rely on arms control as a *substitute* for an effort in the conventional field. For, if the disparity in local power becomes too great, the Soviet Union will lose any incentive for responsible negotiations. No scheme of arms control will then seem to enhance its security as much as its existing superiority. And the requirements of inspection become excessive when the strategic position of one or both sides is so precarious that it can be overthrown by even a minor violation.

This is the measure of the task ahead: simultaneously with building up our capability for limited war and our conventional forces, we will be embarked on arms-control negotiation of crucial import. Our leadership must convince public opinion that we have to increase our military expenditures even while making earnest efforts to negotiate on arms control. The danger of slighting one or the other effort is enormous.

Yet history will not excuse our failure because the task is complex. The divorce between diplomacy and strategy will produce paralysis. If we want limited war forces we will get them only by a major effort. If we are serious about disarmament, we must restore the balance of our military establishment. To continue to combine incompatible policies must lead to disaster.

PAUL DOTY

The Role of the Smaller Powers

As France greeted the fifteenth year of the nuclear age with the explosion of her first atomic bomb, the nuclear club expanded for the first time in nearly eight years. Without international agreements or a display of national self-control uncommon to these times, admissions will come with much greater frequency. Today the smaller powers, the twenty-odd nations that by their own efforts could gain admittance to the club within another eight years, await their inevitable rendezvous with Mephistopheles. The magical power can be theirs, but they are haunted by the uncertainties of the exchange. It is with the question of the desirability of the smaller powers' possessing nuclear arms, and the alternatives they have if the temptation is denied, that this article will be chiefly concerned. The issues are viewed both from the standpoint of the smaller powers and the strategic position of the Western alliance.

The identification of the smaller powers cannot be exact but a useful approximation is available as a result of a study undertaken in 1958 by a small group of scientists working under the auspices of the American Academy of Arts and Sciences to determine the capabilities of nonnuclear nations for producing nuclear weapons. This group concluded in their report[1] that twelve nations (including France) were technically able to embark on independent, successful nuclear-weapons programs in the near future and that eight others could follow shortly. Of these twenty, six were members of NATO (Belgium, Canada, Denmark, France, Italy, The Netherlands, and West Germany), four were members of the Warsaw Pact (Czechoslovakia, East Germany, Hungary and Poland), five were other European nations (Austria, Finland, Sweden, Switzerland, and Yugoslavia), three were major Asiatic powers (Communist China, which is dealt with in a separate article, India and Japan), while standing alone in the Southern Hemisphere was Australia. At least six others should be ready to join this list a decade hence. These then are the Nth countries, those nations for whom nuclear-weapon capabilities can be secured by their own efforts. What will their choices be?

The Experience of Britain and France in the Nuclear Club

Thus far, the nations that have joined the nuclear club have done so in the order of their technological and economic capability. For the Soviet Union, admission was an overwhelming strategic necessity: for Britain and France, the decision turned not only on strategic but also on political and economic considerations, prestige, influence in Washington, commercial interests and scientific ambitions, as well as other reasons only remotely related to the Russian threat. An assessment of what membership has brought Britain and France is clearly relevant to whether or not capability alone should continue to be the condition on which the decision to qualify is decided.

Unlike France, Britain's decision to become a nuclear power was made at the dawn of the nuclear age, when the consequences of success were unclear but full of military promise. From her experience, however, nuclear weapons are seen to have played a dominant but unpredictable role in her changing military posture and accommodation. On the point of expectation, however, it is clear that early membership has brought them a specially favored relation with the United States in the determination of policy and has made possible a unique acquisition of American nuclear techniques. Yet from the day of her admission to the club in 1952, Britain has had to contend with a series of unforeseen difficulties. The first was Russia's unexpectedly early qualification for membership, so that by the time Britain began stockpiling atomic bombs, it was vulnerable both because of its newly independent position and because of its previous acceptance of American bombers on its airfields. Then began under joint Anglo-American responsibility the vast military blunder of our neglecting conventional war capabilities, in the mistaken view that nuclear weapons would do instead. This generated the greatest stresses on NATO, quickened the insistence on rearming Germany, and introduced tactical nuclear weapons, with no doctrine to cover their use.

With the arrival of nuclear parity in the mid-fifties and the imminence of long-range missiles shortly thereafter, the doctrine of massive retaliation needed a successor. In 1957 the British Minister of Defence stated, "We have decided not to defend the whole country, but to defend only our bomber bases," and in 1958 it was affirmed that any major acts of aggression by the Russians, even with conventional weapons, would be countered by British nuclear weapons. But since it had been made clear that the consequences would likely be the total destruction of the country and its people, the credibility of this policy was questioned abroad, while at home, the citizenry began to take exception to the self-sacrificial role for which they had been cast. It was this realization that sparked the campaign for nuclear disarmament, "the most powerful non-party political movement since the War," and initiated an intense debate, which has not yet reached its zenith, over the wisdom of denouncing membership in the nuclear club and setting up a non-nuclear club. This dramatic shift recently received the sanction of one of Britain's best known writers on military affairs, P. M. S. Blackett, who concluded his analysis[2]:

> In fact, I can see no plausible way in which the European defense community can survive either with its own nuclear forces or with individual national nuclear forces. I feel that the present situation, with an American safety catch on all its nuclear weapons, wherever situated, is much more stable than either of those alternatives. However, to keep it stable, it is essential that Britain renounce her own nuclear forces, otherwise their spread to other countries will never be checked.

In the ethical field as well, new voices, independent of the campaign, called for the redress to the erosion of morals that was required to justify the deliberate plan (in certain military circumstances) to annihilate tens of millions of men, women, and children, as against which the victims of Hitler's gas chambers would hardly be remembered. It remained for Lt.-General Sir John Cowley to sum it up[2]:

> The professional fighting man chooses death (instead of dishonor) so that his country may survive, or, on a grander scale, so that the principles for which he is fighting may survive. Now we are facing a somewhat different situation, when the reply is not to be given by individuals but by countries as a whole. Is it right for the government of a country to choose complete destruction of the population rather than some alternative, however unpleasant? Should we in any circumstances be morally right to choose not only the termination of our own existence as a nation, but also the existence of future generations of our own countrymen?

Nor is this the end of Britain's difficulties. Nuclear bombs are essentially useless without delivery systems. In attempting to keep up with the transition from bomber to missile, Britain has spent more than £100,000,000 on developing the Blue Streak Rocket. Early in 1960 it became clear that this rocket would be obsolete before it could be tested. It was consigned to the scrap heap, and Britain opted out of the missile race. This raised the fundamental question: could Britain by itself muster the resources to stay in the nuclear race over the long pull and maintain its posture of an independent nuclear deterrent?

Thus the price Britain has paid for membership in the nuclear club has been very high and is rising. Yet Britain survives and as a nation prospers. Many think that this would probably be the case if it had not been a member; but some find grounds for doubt, taking unassailable refuge in the indisposition of history to allow experiments to be repeated.

If we turn to France, matters simplify, since we have to deal only with motives and expectations, which de Gaulle and M. Moch have articulated rather clearly. The French decision began with the proposition that no alliance or commitment would be strong enough to compel any nation to risk nuclear destruction to aid another. Thus, it is argued, the only nuclear power that will deter an attack on France is one that rests entirely in French hands. Some Frenchmen go on to make three further points: the only nuclear deterrent that will protect other European countries is one that lies completely in the hands of each country; therefore, each European country should have an independent nuclear capability; and since the interests of France are closely enmeshed in those of Europe, France will be safer if every major European country has its own nuclear weapons. De Gaulle's speeches suggest that the mission of French nuclear arms is to build a spearhead of a third force with the rest of the "Europe of Six" constituting the shaft of the spear. In November 1959 he stated, "We must have this atomic force, whether we build it or buy it." But in the real world of 1960, France does not have this choice. Alone, within the next few years, she can only load obsolete and highly vulnerable bombers with bomb loads that are so indecisive as to make the pretension to a third force a mockery. Of course, a major motive in their developing atomic bombs has been their hope that the initiation fee for the nuclear club would bring with it the privilege of sharing in atomic plenty and the means of delivery thereof. This has not been forthcoming, nor can it realistically be expected that either major nuclear power would yield to France the essential components of a third force capable of being pointed at any future date in whatever direction France's particular idea of "balance" required. Thus, by self-deception, France postpones until some future date the reappraisal that tortures Britain today. Already many prominent Frenchmen are questioning the wisdom of the present course, and such men as François Mauriac, Georges Duhamel, and others have denounced the French tests and petitioned for the renouncing of nuclear weapons, "thereby bringing to other peoples the example of a confident and generous will to cooperate and to reinforce the hope of a humane peace which alone will permit world disarmament."

The Smaller Powers and the Nuclear Club

Despite the sketchiness and unbalance in our summary of the British and French experience with membership in the nuclear club, it provides invaluable guidelines to other smaller powers pondering the decision to join, and it confronts the two major nuclear powers with the problems that will be multiplied if membership in the club increases.

If a potential nuclear power judges that its prestige and influence outweigh the cost, and that the threat in Britain of the first split of its bipartisan defense policy in modern times and the helplessness in France to turn a few bombs into a third force are special to those countries, there still remains the question of how much security, if any, is being bought. For NATO members (and in so far as they are free to choose, the Warsaw Pact countries), the strategic arguments vis-à-vis a major power threat cannot be dominant, because they cannot hope to challenge the massive concentration of explosive power and the variety of advanced delivery systems being built up in the Soviet Union and the United States. Nor is it reasonable to expect that an independent nuclear capability of modest proportions could be used to insure the involvement of the American striking force in a crisis, although the risk of doing so would be a destabilizing factor. In short, only a rather low-class, apprentice type of membership seems to be open in the nuclear club, at least in the 1960's.

This conclusion needs perhaps the qualification that those non-nuclear powers with large land masses should be excepted. The reason is that during the coming decade the two major powers will have the capability of devastating a physically small country without diverting their guard against the other major powers. Communist China, India and Australia obviously fit these conditions. For all the others a modest nuclear capability carries no real threat in a potential conflict with either of the major powers. It could only be punitive when used in a first strike, but that would bring a devastating retaliation. In a second strike, the result would be the same, but the damage to the major power would be greatly reduced. Even France must recognize this inescapable asymmetry.

For the other European powers, the situation is little different in effect. Switzerland, Sweden, Austria, and others enjoy an independence that rests upon a strong tradition which is protected by virtue of the fact that a threat to their independence would produce tensions and the risk of a thermonuclear war quite out of proportion to any gain that would come to the instigator. Indeed, it is this condition, together with the weight of quickly reacting world opinion, that extends to all neutrals a protection against military aggression that was almost unknown before the nuclear age.

For the nations somewhat removed from the East-West balance of power, considerations of security are focused on other potential sources of aggression. If China becomes a nuclear power, India, Japan, and even Australia may consider themselves threatened and become actively interested in reacting in kind. The common denominator is the same in all these cases: if a country can gain a nuclear capability that is significant in terms of the potential threats it faces, it can be strategically justified in doing so.

This last point suggests that even in Europe, in the shadow of the Soviet and American atomic umbrellas, a smaller power may develop a small nuclear arsenal, and, by inciting suspicion among neighboring states, induce them to proceed likewise to protect themselves against a day when the mutual concern of the United States and the USSR may be diverted to them. For example, if Spain and not France had become the fourth member of the nuclear club, the reaction in France could have been accurately predicted. So it is that, while most of the smaller powers do not have strategically valid reasons to justify nuclear arming, the decision to do so by any of a number of individual nations could trigger others into following suit, since the threat presented by a nation with a few newly acquired nuclear arms is a challenge they could dare to meet.

Yet strategic considerations, as viewed by the smaller nations, are not likely to be the point upon which the decision to acquire nuclear arms will turn. A diffusion of nuclear arms is more likely to arise in two ways. Other nations experiencing the same heady drive of nationalism as is France will find the acquisition of nuclear arms irresistible as a source of prestige and a symbol of status. Alternatively, if either the Soviet Union or the United States and Britain come to believe that a wider dissemination of nuclear weapons is inevitable, or if the stresses of the cold war intensify and require the ultimate demonstration of faith in "trusted allies," the *carte-blanche* transfer of nuclear weapons and delivery systems might be expected. It is well known that the United States came close to making this decision in February 1960, and it can be easily imagined that the Soviet Union continues to be hard pressed, particularly at times like the Quemoy Crises, to share her atomic plenty with Communist China. It may be well to examine briefly the restraints that both the nuclear powers and the smaller powers will face in contemplating these possible actions.

The Incentives of the Non-Nuclear Club

The case for the major nuclear powers' keeping the nuclear club limited to its present membership is fairly obvious and this is the major motive behind the negotiations for the cessation of nuclear tests. First, there is the natural incentive of the nuclear powers to keep for themselves the vast military power of nuclear weapons. Moreover, the present nuclear powers, having the most to lose if nuclear weapons are used, consider themselves the safest keepers. And then there is the statistical argument: the fewer fingers on the nuclear triggers, the fewer chances of their being pulled. And finally, the dissemination of nuclear weapons, once begun, will have no limit, so that in the end, nations, or rather national leaders, unhampered by the responsibility of the present nuclear powers, will be tempted to use them under trivial provocation. This dissociation of action from responsibility points the way to atomic chaos, where the attacked might not even know the attacker.

Of course, a number of possibilities exist between the present position with Anglo-American and Russian safety catches on all nuclear weapons (except those few in French hands) and the extensive diffusion of such weapons without responsible control. But even to proceed from the present position to one in which NATO members had independent control of weapons provided to them would represent substantial risk to any common defense policy for NATO. Given its present centrifugal tensions, it seems unlikely that a breakup of NATO into a number of nuclear-armed and mutually suspicious states could be avoided. The idea of having a jointly operated nuclear deterrent in Europe likewise does not bear inspection, since it would be too ponderous to be effective and would risk the involvement of all the partners by the careless action of any one.

Nor is the transfer of nuclear weapons to allies any more attractive when tactical weapons are considered. This raises the whole unsettled question of tactical nuclear weapons in the NATO context and can be summarized thus. With no experience in their actual use, it remains uncertain how they would be deployed to be effective, whether more or fewer troops would be required, how supply would be maintained with ports highly vulnerable, how escalation could be avoided, how the people one wishes to protect could be saved from obliteration and even whether such weapons favor the offense or the defense. Obviously, confusion would only be compounded by allowing these questions to be judged by a number of independent authorities.

The uncertainties in the use of tactical nuclear weapons remains, even when they are under Anglo-American and Russian control. The disadvantages to either side that would follow from its initiating tactical nuclear war loom so great that it seems safe to predict that this possibility would be delayed until all other less dangerous means were exhausted. In short, more prolonged exposures to the rigors of nuclear strategy have led to increasing disenchantment with proposals for limiting nuclear war. The consequence is a reassessment of the role of conventional land armies in dealing with the explosive clashes of national wills, so as to maintain a risk that is commensurate with the provocation. The basic military mission of NATO is to provide just such a series of graduated responses. In the end the argument leads unavoidably to the conclusion that the only sensible military policy for the West would be to counter the Soviet conventional offensive forces in Europe by conventional counterforces. This conclusion immediately suggests that the European democracies should again take up the old-fashioned and unpopular job of raising armies by conscription—probably no more popular now than when suggested in a somewhat different context in 1958 by George Kennan.[3] In short, the harsh fact is that it is in conventional arms, together with their continued development, that the West has been lulled into a dangerous neglect, and it is in the redress of this unbalance that the smaller powers could make their strongest contribution to the defensive strength of NATO. This would mean the abandoning of any pretense that the use of nuclear weapons in Europe would be likely to do other than lead to widespread nuclear war. But, in exchange, it does provide a reliable means of dealing with a range of more likely problems, a means that is known to favor defense by a factor of at least three, and a means in which independent national control can be exercised to a large extent.

Parenthetically, it should be noted that by offering an alternative to tactical nuclear weapons this development would indeed contribute to disarmament. Moreover, it would appear likely that any disarmament process will at some stage put considerable reliance on conventional forces.

These views are, of course, quite contrary to those now officially held by the French, which by the extension of their logic would lead to the development of an independent nuclear capability for every nation. By thus littering the world with nuclear booby traps, a fatal Soviet-American thermonuclear exchange would almost certainly be triggered.

If we put aside the French view, it would appear that the present precarious balance of world power has, nevertheless, a certain stability which is vulnerable to an extension of independent nuclear capabilities. By abstaining from nuclear weapons, the smaller powers can contribute to this stability; by taking certain military measures, they can actually strengthen it. But we have not dealt with the several positive steps they can take to improve their own security and contribute to a less militarized and more peaceful world.

The Security and Defense of the Smaller Powers

The military revolution of the postwar period has for all time taken from "security" and "defense" much of their meaning. It was recently revealed[4] that the estimated explosive power of the United States's nuclear weapons exceeds the equivalent of ten tons of TNT for every inhabitant of the world. If all the other nuclear powers together have a similar amount, the total would be an amount of TNT sufficient to cover the entire land area of the world with a blanket an eighth of an inch thick. For a small country, at least, defense against this level of explosive power magnified by its radiological consequences is, in any direct sense, impossible, and security can only really describe the relative effectiveness with which such a power is restrained.

This way of describing by analogy the potential destructiveness in which we are immersed is particularly dismal, precisely because it pictures a situation in which the destructiveness has spread to its limit and is uncontrolled. The source of such security and defensive possibilities as the smaller powers may possess derives largely from the concentration and control of nuclear power in a few nations. Hence, as we have concluded earlier, the security interests of the smaller powers lie in keeping nuclear weaponry stored up in a few countries, in which the variables affecting its release remain manageable.

In the area of defense the outlook is not so limited. While the smaller powers would be impotent to deter the major nuclear powers if they became bent on mutual destruction, the much more realistic concern is the prevention of small wars, or their containment, if they do start. Here the smaller powers play a crucial part, beginning with the insuring of their own defense and their abstaining from any provocative action.

The defensive posture of a smaller power, directed as it must be to a relatively small locale, will be strong only as it incorporates purely defensive components. These include reliance on conventional forces which have in so many cases proven their value in defense over offense. In many instances, the Swiss example of a citizen soldiery may be superior to military units on the pattern of World War II. As such, they could provide the core of a civil-resistance movement on any territory overrun by the invader. The neglect of this role, like the neglect of civil defense by the nuclear powers, greatly weakens the military posture. However, this is not the place to repeat Mr. Kennan's arguments for this course.

It may be well, however, to introduce one other facet of this situation, by calling attention to the unique role which chemical (and perhaps biological and radiation) weapons can fill in the defense of smaller countries. The emotional reactions so often directed against these weapons are inconsistent with a realistic appraisal of modern weapons. Indeed, with the practical development of nonlethal but incapacitative modes of action, these weapons stand alone in allowing an improvement that is not coupled to increased destructiveness. And it is in a defensive role for smaller countries that their advantages are most obvious. For example, by their use a border can be made impassable without destruction and at low cost. The citizenry can be provided with inexpensive and effective protection in advance. In short, chemical agents are increasingly adaptable to the graduated needs of the defense of small countries, and their development and use deserve careful reconsideration in the over-all effort to diminish the risk of nuclear war by reducing the likelihood of aggressive acts by the smaller nations that may by chain reaction lead to an involvement of the major powers.[5]

Disarmament and the Smaller Powers

Beyond the counsel of abstention in regard to nuclear weapons and beyond the military preparations for effective defense lie a number of positive actions by which the smaller powers could guide the world through its present perils and on to the ultimate reconciliation of the human race. Several possibilities can be envisaged in which the smaller powers could play a leading role.

The first area in which the smaller powers can demonstrate their interest in arms control and disarmament is, of course, by contributing ideas and criticism to discussions and negotiations already underway or soon to begin in this area. It is widely admitted that the thought and planning devoted to problems of arms limitations by the major powers is quite inadequate when the magnitude of the problem is viewed in perspective. That is, for twenty years there has been a ceaseless application of the world's best scientific and technological talent, supported by the resources and national will of the great powers, to the improvement of competing military forces. The forces which this has put in motion easily constitute the most extensive and organized effort of modern man. To find a means of controlling and reversing this prodigious effort will require much more than the modest attempts now underway. With the major powers preoccupied with negotiating positions and detailed evaluations, a special need could be filled by the smaller powers by initiating new ideas, suggesting means of resolving conflicts and offering their judgment of the value of each successive development. Indeed, the complexity of the problems that must be solved if disarmament is to be approached is such that the active, informed, and sustained interest of the smaller powers may well be an absolutely essential ingredient for maintaining the interest of world opinion as successive attempts and failures tend to breed a fatalistic apathy.

This coin has an opposite side as well: the need for constructive cooperation in each stage of arms control that the great powers can agree upon. The Nuclear Test Cessation negotiations provide a clear and cogent test to the smaller powers on this point. In the negotiations themselves the smaller powers do not have a direct voice. But by informal approaches and better liaison with the participants the informed concern of the smaller powers could have a useful impact. If a treaty in this area is achieved, the smaller powers will have a new and greater opportunity to contribute. This obviously arises because the success of such a Test Cessation Treaty will depend upon the agreement to restraints among the smaller powers just as much as among the nuclear powers. In this, or whatever may be the first disarmament measure agreed to by the major powers, the critical phase will be that in which the adherence of all the smaller powers (and China) will be sought. It is difficult to foresee a more searching test of the concern, the vision, and the diplomatic skill of the smaller powers. Their role would be vital in reaching the nearly unanimous agreement essential to such measures. Failure at this stage would bring to an end the disarmament effort that had gone furthest toward fulfillment.

Another example of a situation in which the cooperation of the smaller powers would be vital is in the often discussed proposal for disengagement, particularly in Europe. The details of the several specific proposals need not be discussed here. What is important is the growing acceptance of such proposals in the West as well as in the East. As the Anglo-American nuclear deterrent becomes less and less credible in the eyes of West Europeans, the land defense of their homeland receives a higher priority. This is compatible with, and could be aided by, the creation of a zone of disengagement in Central Europe. With different reasoning, the East European countries are led to similar conclusions. As time passes, the Soviets have less need on several counts to insist on the political and ideological conformity of the members of the Warsaw Pact. Thus, if this is not a misreading of the many indications of increasing flexibility, the time is near when an initiative by smaller powers may elicit an acceptance of an area disengagement by the major powers. Of course, an experiment in disengagement, by itself, will not assure progress on the road to peace, but it will present new opportunities for the relaxation of tension, for the return of more nearly normal contacts in Central Europe, and for the trial of a new kind of accommodation between East and West. Beyond this, it offers a test case for disarmament, since denuclearization and later disarmament itself could find their initial trials in this arena.

In addition to the general area of responsible involvement in the planning and early stages of disarmament measures, other roles[6] of the smaller powers can be mentioned briefly. For example, there is the unique role that the smaller powers could play in the evolution of a permanent and effective United Nations Emergency Force or its equivalent. That this is an urgent need at present and an essential device in maintaining a balance of power as disarmament might proceed has been widely documented. While such a force has often been opposed by the Soviet Union and some other nations such as India, the establishment of at least a stand-by force has been sanctioned by the Uniting for Peace Resolution passed by the United Nations Assembly in 1950. Moreover, it is widely agreed that if such a force were established on a permanent basis, it should not include permanent Council members. Hence, there is here a vital opening for wise initiative and concerted action by the smaller powers.

Third, there will be a large and demanding role for the smaller powers to play if and when disarmament gets under way. Whether the route of partial measures or of comprehensive disarmament is followed or not, the need for technical and military personnel trained in modern weaponry and communications, skilled in languages, competent in administration and perceptive and understanding in human relations will be very great indeed.

Finally, the smaller powers cannot remain oblivious to the opportunities for moral leadership that their abstinence from nuclear weapons affords. The unselfish aid of many such nations in the area of refugee relief testifies to their responsiveness to human need. The power of example remains a valid means of influencing the conduct of nations as it does the conduct of individuals. The nations that share the benefits of industrial civilization are divided by ideological prejudices and human passions that many smaller powers can help to put into a perspective based on civilized values rather than the arbitrament of unreasoned and unlimited power.

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5 The consequences of research and development in weapons systems are difficult to predict, hence such recommendations require some caution. In the case of agents of chemical warfare, their further development and deployment by the smaller powers could stimulate the major powers to a greatly expanded effort in this area, resulting perhaps in a breakthrough to a different lead in efficiency. This would have unpredictable effects. However, the possibility of a substantial breakthrough in chemicals seems unlikely, since effectiveness as based on weight appears to be approaching a limit. To incrase the yield, therefore, one can depend only on increasing the efficiency of dispersal at the target.

6 A discussion of many specific roles that the smaller powers could play cannot be included here since they depend on particular disarmament plans which are beyond the scope of this article.

A. DOAK BARNETT

The Inclusion of Communist China in an Arms-Control Program

COMMUNIST CHINA poses some extremely complex problems for the other major powers concerned with world-wide arms control. To date, these problems have remained largely in the background, but if and when the other powers can make significant progress toward international agreements, the dilemmas posed by Peking will come rapidly to the forefront. Before that day arrives, they deserve careful examination and analysis. Special attention should be devoted to nuclear developments in Communist China and their implications for the international problem of nuclear arms control.

When the Chinese Communists came to power just over a decade ago, they knew little about modern weapons of mass destruction, and apparently Chinese leaders greatly underestimated their significance. Soon after Peking's intervention in the Korean War, for example, an article published in one of Communist China's principal progaganda journals argued that "the atomic bomb itself cannot be the decisive factor in a war," since "the more extensive the opponent's territory is and the more scattered the opponent's population is, the less effective will the atom bomb be."[1] Three years of war in Korea clearly had a profound impact, however, on the military-strategic thinking of Peking's leaders and greatly spurred the modernization, with Soviet assistance, of Communist China's entire military establishment.

Not long after the war, the Chinese Communists, aided by the Russians, began moving toward what was to become a major drive to foster modern science and, more specifically, to prepare China for the atomic age. In 1954 a Sino-Soviet Scientific and Technical Cooperation Commission was established.[2] A few months later, in January 1955, Moscow launched an important special program of "scientific and technical assistance" to other Communist bloc countries—including China—for the development of "atomic energy for peaceful purposes," and promised to supply them with research reactors and "the necessary amounts of fissionable materials for the reactors and for research purposes."[3] Shortly thereafter, the Chinese Communists and the Russians signed an implementing agreement for cooperation in the atomic energy field.[4] And finally, in January 1956 Premier Chou En-lai publicly revealed that a twelve-year plan covering 1956-1967 was being mapped out "to introduce the world's most advanced scientific achievements" into China.[5]

In this 1954-1956 period, the Chinese Communists still had little to say publicly about their intentions regarding atomic bombs, but it is significant that they showed signs of adopting for the first time what was, in effect, a kind of nuclear posture, emphasizing in their propaganda aimed at the Japanese the vulnerability of Japan to atomic warfare. And they proceeded without delay to construct the research reactor provided by the Russians.

During the first half of 1958, as a reactor near Peking neared completion, and only a few months before the Chinese Communists initiated the second Quemoy crisis, the first hints appeared of Communist China's intention ultimately to obtain nuclear weapons. The initial statement of this intention was made by Peking's Foreign Minister, Ch'en Yi, in May 1958, during an interview with some German correspondents. Exactly what he said is not wholly clear, since the reports on the interview vary. One correspondent quoted him as saying, "At the moment China does not own atomic weapons, but we shall have them in the future."[6] Another correspondent implied, however, that the statement had been somewhat more ambiguous and conditional; he reported that Ch'en said: "No Asian country possesses long-range atomic weapons, not even China. If the U.S. should station such weapons in Asia, Peking would examine if China, too, must have nuclear weapons, because such American weapons would be chiefly directed against China."[7] The implied warning that Communist China might well obtain nuclear weapons was clear, in any case.

During the same month (May 1958) a top Chinese Communist military leader also declared that it was Peking's intention to obtain nuclear weapons; his statement was more specific and unambiguous. In an article in a Chinese Communist military journal, *Chieh Fang Chün Pao*, Peking's Air Force Commander Liu Ya-lou said: "China's working class and scientists will certainly be able to make the most up-to-date aircraft and atomic bombs in the not distant future."[8]

Then, in July 1959, the Italian Communist Party paper *Unità* quoted the Vietnamese Communist leader Ho Chi-Minh as saying, "In the not distant future, the Chinese as well will have atomic bombs."[9]

During the period marked by these various statements, there were a number of indications that the Chinese Communists might be applying increased pressure on the Soviet Union to provide China with stronger military backing in the nuclear field, as well as in other military fields. In fact, if the events before, during, and after the 1958 offshore islands crisis are carefully analyzed, in retrospect it appears either that Peking consciously and successfully exerted pressure on Moscow to extract promises of significantly increased nuclear support, or, alternatively, that prior to the crisis Moscow had agreed to play a supporting role that implied a willingness to make such commitments. Khrushchev made several statements during the crisis which went far beyond the pledges inherent in the 1950 Sino-Soviet alliance. On 19 September, for example, in a letter to President Eisenhower, he declared: "I must tell you outright, Mr. President, that atomic blackmail with regard to the People's Republic of China will intimidate neither us nor the People's Republic of China. Those who harbor plans of an atomic attack on the People's Republic of China should not forget that the other side too has atomic and hydrogen weapons and the appropriate means to deliver them and, if the People's Republic of China falls victim to such an attack, the aggressor will at once get rebuffed by the same means."[10] Apparently the Soviet Union has now, in effect, committed itself either to use nuclear weapons itself to support Peking, or to turn over nuclear weapons to the Chinese Communists, in the event of a nuclear attack against the China mainland.

Since 1958, there have been a variety of reports—of varying credibility—which suggest that Peking has been moving steadily toward the goal of acquiring a capability of its own to wage nuclear war. In the summer of 1959, for example, Governor Averell Harriman reported that Khrushchev had told him, in an interview in the USSR, that Russia had shipped numerous rockets to China.[11] In June 1959, a *Christian Science Monitor* report from Singapore, citing "military intelligence experts" there, declared that it was "known" that a Soviet military mission with four high-ranking generals was currently in Communist China advising on the modernization and reorganization of Peking's army; the report further stated that China was believed to be forming some pentomic divisions capable of using "nuclear tactical equipment."[12] In the early autumn a similar report regarding Soviet assistance for the organization of pentomic divisions in Communist China was dispatched from Hong Kong to the *New York Times.*[13] In January 1960, another *New York Times* story from Washington, D.C., cited a "government intelligence report" predicting that Communist China would be able to launch an earth satellite in two years, possibly with Russian rockets if not its own, and asserted that the Chinese Communists had started a rocket program of their own.[14] And in February 1960, a Chinese Nationalist Defense Ministry spokesman declared that the Chinese Communists had already constructed a string of rocket bases along the China coast.[15]

The most extensive of all claims to date concerning Peking's recent progress toward membership in the "nuclear club" appeared in January 1960, in a Hong Kong datelined story in *U.S. News and World Report,* written by a correspondent who cited "intelligence experts in Hong Kong" as his source. This article claimed that, in addition to the one known Chinese research reactor, Communist China has already built one other reactor in northern Manchuria and is in the process of constructing two more, one at Sian in northwest China and another at Chungking in the southwest. On the basis of this information, the author asserted, "Experts here [in Hong Kong] now believe Communist China will be able to fire its first atomic device late in 1961 or early in 1962." [16]

It is difficult to evaluate these fragmentary reports and bits of data; conceivably, some may be based partially on speculation, or misinformation. Yet even if one discounts all such reports and examines only the most reliable data on nuclear developments in Communist China, the known facts point to conclusions about Peking's potential for developing an independent capacity to produce nuclear weapons which provide no basis for complacency.

It seems clear from the known facts that Communist China is currently developing the basic resources, technical skills, and equipment necessary to produce and explode a nuclear device in the relatively near future. It is believed to be mining uranium in Sinkiang, and it is significant that when the Soviet Union announced in January 1955 that it would help Peking build a research reactor and would provide it with fissionable materials, Moscow stated that the Chinese were "supplying appropriate raw materials to the Soviet Union."[17] In any case, China is receiving some enriched uranium from the Russians. Communist China's pool of technically qualified personnel is clearly growing quite rapidly, and Peking may already have enough scientists competent in nuclear matters to produce and explode an atomic device. Some of them have been trained at the Joint Institute of

Nuclear Research established in the USSR in 1956.[18] In 1958, Peking established its own Institute of Atomic Energy Research, headed by a former collaborator of Joliot-Curie.[19] Most important, the Chinese Communists now have in operation the basic facilities necessary both to conduct the required research and to produce the needed plutonium in order to construct an atomic device. These facilities include a research reactor of from six and a half to ten megawatts, a twenty-five-MeV. cyclotron, and an accelerator provided by the Soviet Union, as well as a high-tension multiplier and several accelerators built by the Chinese themselves.[20]

The reactor, which has been operating since June 1958, is a heavy-water research model, originally rated at six and a half megawatts by the Russians but capable of operating at a higher level and now classed as a seven-to-ten-megawatt reactor by the head of the Chinese Institute of Atomic Energy Research. Its fuel consists of enriched uranium (enriched to 2 percent in isotope content of U-235) supplied by the Soviet Union. According to one careful estimate,[21] this reactor could produce enough plutonium in approximately four and a half years for the manufacture of a nuclear bomb or device with an explosive power of roughly twenty kilotons—approximately the size of the Nagasaki blast in 1945. If one assumes that the Chinese Communists have in fact used the reactor for this purpose since mid-1958, this means that with the output of this one reactor the Chinese Communists conceivably could build and explode an atomic device by mid-1963.

This estimate indicates when the Chinese Communists might be able to produce an atomic explosion "on their own," but it assumes at least a minimum degree of continued Soviet cooperation. First of all, it assumes that the Russians are willing to provide the Chinese with continuous fuel loadings, and second, that Peking is not, and will not be, restricted in how it can use the plutonium produced by the reactor.

This does not mean, however, that one must assume that the Russians are necessarily enthusiastic about the prospect of Communist China developing an independent nuclear capacity. It seems likely, in fact, that while the Soviet Union has probably felt—perhaps under continuous pressure and prodding from Peking—that in order to maintain the solidarity of the Sino-Soviet alliance it must provide the Chinese Communists with at least minimum assistance in the nuclear field, it has probably also felt quite ambivalent about the prospect of Communist China joining the "nuclear club." A number of facts suggest such an ambivalence on the Soviet part.

It is worth noting that the research reactors given to Communist China and Yugoslavia by the Russians are different from those given to the European satellite states; although technically they are better reactors, with a higher operating level, it may be significant that as fuel they use uranium which is enriched with only 2 percent U-235, while the reactors in the satellites, where the Russians exercise firm political control, are more standard Soviet models using fuel enriched with 10 percent U-235 (a grade of U-235 which, if diverted, could be reprocessed far more easily to weapon grade than can 2 percent material).[22] It may also be significant that, despite an obvious desire on the part of the Chinese Communists to obtain power reactors (apart from their economic value, such reactors can use natural uranium for fuel, and can produce large quantities of plutonium usable for weapons purposes), the Russians have still not made a power reactor available to Peking, even though they have promised them to several satellite nations.[23] Certain other aspects of Soviet policies, particularly in the period since 1957, may provide additional clues to Soviet attitudes toward Communist China and the nuclear weapons problem. Since late 1957, for example, it has been the Russians, interestingly enough, rather than the Chinese who have taken the initiative in promoting the idea of a "nuclear free zone" in Asia, and Peking, while it eventually endorsed the idea in a dutiful fashion, at no time has seemed to show great enthusiasm for it.[24] It is also noteworthy that while the Soviet Union since 1957 has shown increasing signs of a desire at least to negotiate seriously with the Western powers about arms control, and since 1958 has promoted its "peaceful coexistence" line in a most energetic fashion, Communist China in this period has shown little interest in the arms-control problem; on several occasions it has adopted a militant posture on issues directly affecting its interests; and it has made a number of official declarations which seemed out of step with current Soviet policy.[25] One of the most specific hints of a possible divergence between the Russians, with their energetic advocacy of nuclear arms control (including a test ban) and the Chinese Communists, with their presumed desire to join the "nuclear club," was made by Mikoyan in February 1960. After delivering a speech in Oslo to the Norwegian Students Association, Mikoyan was asked what effects the recent French atomic explosion would have on "peaceful coexistence" and whether it would lead Communist China also to desire possession of atomic bombs. "We wish to forbid all atomic tests," he is reported to have replied. "If there will be no agreement on this, China may have atomic weapons. The sooner we get an agreement the greater are the chances that there will be no more explosions."[26]

However, while reassuring inferences might be drawn from statements of this sort, it would be unwise to do so; as Secretary of State Christian Herter has pointed out, things may be more complicated than they seem. "The Chinese at the present time are taking a very different line from the point of view of relaxation of tensions, if you want to call it that, than are the Russians," Herter said at a press conference in April 1960. "Whether this is a deliberate play between the two of them or whether they are actually taking different lines, it's very difficult to tell."[27]

In the light of the above, plus what is known in more general terms about the character of the Chinese Communist regime and its present leadership, it seems reasonable, prudent, and necessary to assume not only that Peking will attempt to join the "nuclear club" as soon as possible, but also that it may be able to do so within a relatively short period of time—perhaps within the next three years.

In attempting to estimate the possible consequences of this eventuality, it is necessary to keep a number of important factors in mind. First of all, Communist China's leaders are clearly determined to achieve major power status, and, as their power grows, their demands for international acceptance, and for a greater voice in world affairs, might well become increasingly strident and insistent.

Even more important, perhaps, it would be a mistake to ignore the fact that Communist China is at present a frustrated nation, and the combination of great ambitions, growing power, and deep frustration can be a dangerous mixture. Of all the major powers, Communist China is the only one with significant unsatisfied claims to territories that it promises ultimately to "liberate," by military force if necessary. (The offshore islands and Taiwan are by far the most important of these.) It is also the only major power that is excluded from the most important international councils.

Moreover, if one compares Peking's leaders with those of the other major powers, even including the Soviet Union, they still appear to be motivated by a particularly strong revolutionary zeal, which greatly affects their view of the world. These leaders have shown little evidence to date that they consider international stability—even military stability in a precarious nuclear age—to be an important goal.

Contrary to widespread opinion, the Chinese Communists are by no means wholly rigid or reckless; they are, in fact, capable of calculated self-control and restraint, as well as considerable agility and flexibility, at least in a tactical sense. But there is little to indicate that they regard tensions and crises as being necessarily undesirable; on the contrary they seem to regard them as an important part of the essential stuff of which the dialectic of history is made. One might add that it is difficult to know how fully they understand, even now, the nature of the risks of modern nuclear warfare.

Given the nature of the Chinese Communists' motivations, goals, and patterns of behavior, the prospect of Peking's acquiring an independent nuclear capacity is an extremely disquieting one. It poses the "*n*th power problem" to the *n*th degree. The initial impact of Communist China's joining the "nuclear club" by exploding either a bomb or some other sort of nuclear device would doubtless be more psychological than military, but Peking would certainly exploit this impact to the maximum to build up China's prestige and give added weight to all of its claims and policies.

Then, if it began slowly to accumulate even a few bombs (it would take several years to build a stockpile of any real size), Communist China might well be tempted to exert increased military pressures on neighboring countries, or to adopt a nuclear posture in support of friendly insurrectionary forces in these countries, or to try outright nuclear blackmail in certain situations. Even if it refrained from overt pressures and threats, while switching back to tactics placing increased stress upon "peaceful coexistence"—which is possible—its possession of nuclear weapons might nevertheless add greatly to Communist China's influence. Doubtless Peking would attempt to deter the United States from intervening in Asian crises and would do its utmost to neutralize American nuclear power in the region (perhaps especially in the area of the offshore islands and Taiwan Strait); it might attempt to do this by threatening, in effect, to trigger a nuclear conflict which could soon involve the Soviet Union and thereby expand to global war. Even an implied threat that it might do this would carry a good deal of force. It is very possible, in short, that the situation in East Asia, which is already sufficiently unstable, as the history of the past decade amply demonstrates, could become considerably more dangerous and volatile if and when Peking joins the nuclear powers.

The desirability of forestalling these consequences is hardly arguable, but in realistic terms the possibilities of doing so seem relatively unfavorable. Perhaps the first requirements for a successful effort to prevent the consequences suggested above would be: the conclusion of an effective atomic test ban; Peking's adherence to it; and adequate inspection within Communist China to enforce Peking's verbal commitments. However, even this would not necessarily prevent the Chinese Communists from accumulating fissionable material and constructing "primitive" bombs, without testing them. The fact that all four of the present nuclear powers successsfully exploded their first devices would probably lend credibility to any claims, or suspicions, that Peking had accumulated a supply of fissionable material, and had built up a stockpile of usable "primitive" bombs, even without testing.

The only really dependable means of ensuring that the Chinese Communists could not carry out a clandestine program to produce nuclear weapons would be to conclude an international agreement, with Peking's participation, for the control of all fissionable materials, a program that would require on-the-spot inspection at every nuclear reactor.

While a test ban would not, in and of itself, provide foolproof safeguards against Communist China's developing a program to produce atomic bombs, there are many who argue that it is an important first step, and it is amply clear that even this "first step" toward world-wide nuclear arms control cannot be made effective and enforceable unless the Chinese Communists are ultimately included. Technical studies of the detection problem leave little room for doubt on this score. On the basis of preliminary studies, experts have maintained that any world-wide monitoring and inspection network would probably require at least thirty-seven manned posts on the Asian mainland, about twelve of them on Chinese Communist territory, in order to ensure that a reasonable proportion of all underground explosions of over nineteen kilotons could be detected and identified.[28] Recent studies of the muffling of underground explosions indicate that probably many more posts would be required. However many posts may be necessary, unless there were adequate coverage of the China mainland, either Peking itself could in due time conduct small underground explosions, or it could, at any time, permit its Soviet ally to do so.

Since even the "first step" toward international controls of nuclear weapons cannot be effectively implemented without Peking's participation, it seems clear that the key question (assuming international agreements on nuclear controls are practicable at all) is not whether Communist China should be included, but rather how and when.

Current United States policy on this question, and the assumptions which seem to underlie it, deserve careful examination. Briefly stated, the present policy seems to be that, if and when the nations currently negotiating on arms control can reach agreements, then the need to make these agreements fully effective will require consideration of how to obtain Peking's adherence, but that in the interim it is not necessary either to bring Communist China into the negotiations, or to take preparatory steps to lay the groundwork for dealing with Peking at some later stage. Unlike his predecessor, who seemed to evade the issue of whether it would be necessary eventually for the United States to negotiate directly with Communist China on arms control, Secretary of State Herter has stated that it is "wholly possible" that at some stage the Chinese Communists will be brought into disarmament discussions.[29] He has also said, however, that he did not "see the necessity of bringing Red China in until the nations that are going to be sitting at that table come nearer to agreement,"[30] and that he does not think negotiating with Peking on arms control "would necessarily require Communist Chinese membership in the United Nations any more than it would require recognition by any power of China."[31]

This position seems to rest on some optimistic, and perhaps dubious, assumptions. First of all, it seems to assume that, if and when Peking is brought directly into the arms-control picture, even if it tries to exploit the situation by bargaining for recognition, United Nations membership, or other political gains, there will not be any necessity to make concessions or to deal with broad political questions that would immensely complicate the problem from the American viewpoint. This hope seems to be based, in part at least, upon the assumption either that the Soviet Union would exert sufficient pressure on Peking to induce it to adhere to any agreements previously endorsed by the Russians, or that there would be other imperatives which would impel the Chinese Communists to cooperate even if they could not achieve any of their major current political aims or claims.

In realistic terms, the prospects may be much less optimistic than assumptions such as these would seem to imply. While there is no doubt that theoretically Peking could adhere to, and participate in, any arms-control agreement previously concluded by the other major powers without its being accorded diplomatic recognition or a seat in any existing international organization (the Soviet Union adhered to the Kellogg Treaty for outlawing war in 1928 when Moscow was still not a member of the League of Nations or recognized by the United States), the prospect that Communist China would actually do so, and would forego raising broad political questions, seems very dubious.

Peking has not shed very much light on its intentions in this regard, but it has made it clear that it cannot be expected automatically to adhere to any arms agreements concluded by the other powers. "Any international disarmament agreement which is arrived at without formal participation of the Chinese People's Republic or signature of its delegates cannot, of course, have any binding force on China," Foreign Minister Ch'en Yi said in January 1960.[32] Probably the key words in this statement are "formal participation"—which doubtless mean participation in the basic negotiations—and one fundamental question which they raise is what Peking might demand as the price of its participation and agreement.

Judging by the Chinese Communists' behavior in international affairs throughout most of the past decade, it seems highly probable that, if invited to adhere to an arms-control agreement, they would engage in some very hard bargaining. They might, in fact, bargain for sizable political gains as the price of even agreeing to negotiate. Conceivably, they might raise not only issues such as United Nations membership and recognition but also their territorial claims to the offshore islands and Taiwan. Moreover, whatever price they might try to exact as the precondition of negotiating, it is very possible that, even after agreeing to talk, they might demand major concessions by the United States—such as, perhaps, the withdrawal of all American nuclear weapons from the Asian region. They might insist on going over the ground already covered by the other powers, raising again many of the technical issues concerning inspection and control (as they would affect China specifically) which from the start have required long and excruciating negotiations between the Western powers and the Soviet Union. Their bargaining position in such a situation would be a relatively strong one, since really they could bargain by merely doing nothing—by being obstructionist—in the hope that the pressures of world opinion might ultimately impel the Western powers to make concessions.

What are the prospects that the Soviet Union might be induced to bring effective pressure on Communist China to cooperate on arms control? As noted already, there are reasons to believe not only that Moscow is more concerned about the need for arms control than Peking, but also that it may have definite reservations about the possibility of Peking's becoming a nuclear power. Yet the character and evolution of Sino-Soviet relations over the past decade provide little basis for hope that Moscow could or would force the Chinese Communists to cooperate on arms control if Peking were to decide firmly to be obstructionist. The record of recent years indicates that the Russians do not dictate to the Chinese Communists: they negotiate with them. It also indicates that preservation of the Sino-Soviet alliance is still of primary importance to both Moscow and Peking and takes precedence over lesser aims and considerations. None of this should be taken to mean that every effort should not be made to induce Moscow to exert pressures on Peking to cooperate. It does mean, however, that the Russians may not be willing to exert very strong pressures—which might threaten the basic solidarity of the Sino-Soviet alliance—and that consequently it seems unlikely that the Western powers can rely on the Russians to solve their problem of how to deal with the Chinese.

All of this leads to a question which may be at the heart of the matter: to what extent is it realistic even to consider the possibility of arms-control agreements with Communist China as long as the present over-all political situation in East Asia remains unchanged?

In the hearings on disarmament and foreign policy held by the Disarmament Subcommittee of the Senate Committee on Foreign Relations in 1959, one distinguished observer, concerned primarily with European rather than Asian problems, declared: "It is the political issues which are basic . . . armaments are more apt to be a function of political disagreement than vice versa, and . . . efforts to reduce tensions by seeking agreement on the reduction and control of armaments, while leaving the political issues unresolved, are not hopeful."[33] If this statement has relevance to the situation in Europe, it doubtless has even more relevance to East Asia.

At present the existing tensions and conflicts of interest in East Asia are so fundamental that one can question whether there is any immediate prospect of discovering successful approaches to the basic problem of arms control in that area. And if, as seems to be the case, even a "first step" on the international arms-control problem, such as a nuclear test ban, must be dealt with on a world-wide basis to be effective, this fact poses some far-reaching dilemmas.

Does this suggest that, if the current arms-control negotiations do achieve some success, the United States must consider making major political concessions in order to obtain Peking's cooperation? There is no easy answer to this question. But there are cogent arguments against the idea of making major concessions to Communist China under duress; the political effects of such concessions—on the United States' allies in Asia, and even, for that matter, upon the neutralist nations—might be extremely adverse. Perhaps, therefore, if arms control is important, and if the implementation of world-wide arms control will require Peking's participation, and if this seems unachievable or impractical unless there is some lessening of existing tensions in East Asia, the most reasonable course of action might be for the United States government to take the initiative in pressing much more actively to stabilize the existing situation throughout the East Asian region and to reduce existing tensions, modifying its present policies toward China in whatever ways seem possible and desirable toward this end.

Such a course of action would require a careful re-examination of United States policy toward China and a realistic determination of what is negotiable or adaptable in that policy. This is an area of great controversy in the United States. However, it is the author's view[34] that, while there is no room for negotiation or change in the United States' basic commitment to defend Taiwan and the other non-Communist states bordering Communist China against aggression, the United States can legitimately explore the possibilities for a constructive change of posture with respect to the offshore islands, Peking's representation in the United Nations, and the possibility of *de facto*, or ultimately even *de jure*, American recognition of the Chinese Communist regime's jurisdiction on the mainland of China. A more flexible American policy would not necessarily elicit immediate concessions from Peking, but, if it tended over time to reduce the intensity of existing conflicts of interests in East Asia, the possibility of considering arms control negotiations relating to that area would certainly be improved.

Throughout this discussion, it has been assumed that the issues of nuclear arms control—starting with the problem of enforcing a test ban—will come to the forefront in relation to China before issues of general disarmament. Perhaps at least a postscript should be added on the relation of the Peking regime to the problem of general disarmament.

While Peking's relation to the problem of nuclear controls is based on the fact that it has the potentiality of becoming a nuclear power and is already allied with one, it would be a dangerous error to forget that Communist China is already a major power in terms of military manpower and conventional weapons. Over most of the past decade, it has posed a serious threat to the stability of East Asia despite its lack of nuclear weapons. It possesses a regular army of about two and a half million men; at present this is the second largest army in the world, and if the Soviet Union carries out its promised manpower cuts it may become the first. Peking also maintains sizable public security forces, a large organized reserve, and huge militia forces. In addition, its air force of at least 2,500 planes—1,800 or more of which are jets—is the largest in Asia and can hardly be ignored.[35] Peking's total forces are greater, in fact, than those of all the other nations of non-Communist East Asia combined. The principal basis for maintaining any sort of military balance in that region over the past decade has been the fact that the United States has backed up the weaker forces of the non-Communist nations in the area, and, since the Korean war, the Communists have had to weigh the possibilities of American intervention in any important conflict in that region.

Considering the size of Peking's conventional forces, it seems clear that no general disarmament program involving a world-wide reduction of forces would be practicable without Communist China's participation. Moreover, since progress toward the achievement of effective agreements on comprehensive disarmament would, under the best possible circumstances, take considerable time, in the short run the United States, while working toward nuclear arms control, must devote increased attention to the improvement of its capacities to meet a variety of possible Chinese Communist threats with conventional military forces. It is true that this further complicates an already extremely perplexing problem, but there is little merit in ignoring complexities that are real and inescapable.

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The Domestic Implications of Arms Control

The discussion of the domestic implications of arms control, for the United States or for other countries, depends greatly on the concept of arms control which is in the mind of the discussant. The very discussion of arms control is an indication that unilateral national defense is unsatisfactory and that some substitute is to be sought. The nature of the dissatisfaction, however, and the nature of the substitute, is subject to wide variation even among the authors of this group of essays. The concept of arms control as "military cooperation with potential enemies" seems to me the most fruitful, especially as extended to include the concept of organization for all kinds of cooperation with potential enemies designed to produce mutual security and to reduce enmity.

This concept is clearly shocking to those who are emotionally committed to the ethic of unilateral national defense, or those whose hatred of the potential enemy is so intense that they cannot bear the thought of cooperation. It is, however, a concept which is being forced upon us by the nature of modern war. So little serious intellectual attention has been given to the problem, however, in comparison with the enormous effort devoted to unilateral national defense, that we find ourselves on the threshold of doomsday unprepared to spell out even the larger framework of the changes which are now necessary in the world social system if man is to survive.

We do not even know, for instance, whether arms control will in fact lead to less government spending on defense, including the costs of inspection or of inter-armed-force or inter-nation organization. There are those who argue that arms control might lead to a larger military budget, especially if control were confined to the weapons of mass destruction. In the absence of adequate information on this point, any discussion of domestic implications must be highly speculative. It is important, however, not merely to speculate but also to build theoretical and statistical models of the domestic social system which can accommodate a number of different possibilities, even quite extreme cases. The economic system is that part of the social system in which such model building is most highly advanced, and where therefore the effects of various patterns of arms control can be most clearly followed. The economic system, however, is highly dependent on political decisions and on psychological attitudes, and we cannot be content with a mere economic analysis. Economic analysis, however, is a good place to begin, not only because in the present state of knowledge it offers the best chance of success, but also because in the minds of many people, and especially noneconomists, the economic consequences of arms control, and especially of disarmament, are a source of real anxiety.

The anxiety stems from the association of disarmament with depression and with extensive economic dislocation. The prosperity of the 1940's and 1950's, by contrast with the misery of the 1930's, is associated, whether the association is justified or not, in the minds of many people with the high level of war and defense expenditures in the former periods, and with the low level in the latter. The memories of the Great Depression are still strong in the minds of the middle-aged and the powerful, and the fear of another such experience, though by now driven down into the unconscious, is an active determinant of our value system. Nobody wants to suggest that the United States would deliberately sabotage an attempt at arms control because of this fear of depression; the frivolity and hypocrisy with which the subject of disarmament was treated in official circles in the pre-sputnik era was due almost entirely to an emotional and intellectual commitment to unilateral national defense, not to any fear of economic consequences.

Nevertheless, it is important to examine, and if possible to remove, this economic anxiety. Arms control is going to be a very difficult road to find, beset with legitimate anxieties and risky decisions. The advance clearing away of minor obstacles, illegitimate and unnecessary anxieties, and falsely imagined risks is an important part of the pathfinding process. It would be unspeakably tragic if the great moment in history arrived at which opportunity presented itself for a transition from the present system (the road to doomsday) to a system which offered at least a chance of human security and decency, and if we then found that illusions about economic systems caused us to stumble and take the wrong road.

There are, then, three major domestic economic problems which arms control may represent, summarized as *conversion, stabilization,* and *growth.* These are all general problems of the economy and are not peculiar to arms control. Conversion is the problem of how to adjust the structure of production in the economy—that is, the commodity mix of total output—to shifts in the structure of total demand, public and private. Stabilization is the problem of how to control the vicious dynamic processes of deflation, depression, and unemployment, on the one hand, or inflation on the other, which may be initiated by these shifts in the structure of total demand. Growth is the problem of achieving a structure of total demand which will give the society an optimum rate of economic growth; the latter might be defined as the maximum rate of growth which is subject to the constraints of its basic value system.

Conversion is a problem that is always with us. The movement of technology, trade opportunities, and public and private demand, constantly imposes on any economy the necessity for altering its product mix and the occupational distribution of its labor force. In the course of the past two hundred years, for instance, the United States has shifted the proportion of its labor force engaged in agriculture from about 90 percent to 10 percent under the impact of a great technical revolution, which has resulted in a more than tenfold increase in output of food and fibers per man-hour. Agricultural policy testifies both to the magnitude of the conversion problem involved and also to the ability of governments to hamper it.

To come closer to the immediate topic, the United States has suffered enormous fluctuations in the proportion of the gross national product allotted to national security (defense) in the past twenty years; at present, the latter is a little less than 10 percent of the gross national product, and the recent trend is illustrated in Table 1.

The rise in national security expenditures from the almost negligible levels of the 1930's to the heights of the mid-1940's (World War II) was, of course, accompanied by a sharp rise in GNP and a dramatic fall in the percentage of unemployment. Here we have the origin of the myth of defense-inspired prosperity. It is a myth which derives its power from the fact that it is not wholly untrue and is rooted in the personal experiences of millions of people. Nevertheless, it *is* basically only a half truth. The outstanding fact is the remarkable stability and success of the American economy under the impact of the massive armament and disarmament of the 1940's, when, for instance, in one year (1945-1946) we transferred an absolute amount of manpower and resources from war to civilian employments more than twice as much as would be involved (in real terms) in total and complete disarmament at present. The post-Korean disarmament was less well managed: unemployment rose to a disquieting 5 percent in 1954, but subsided again in later years in the face of a continued fall in the real defense burden.

TABLE 1

United States Gross National Product (GNP) and National Security Expenditures (NSE) in real terms (billions of dollars) at 1959 prices, selected years.

YEAR	GNP	NSE[1]	NSE / GNP (%)	UNEMPLOYMENT AS % OF LABOR FORCE[2]
1939	211.5	3.2	1.5	17.2
1944	366.3	164.7	45.0	1.2
1945	359.4	139.8	39.1	1.9
1946	316.0	26.7	8.4	3.9
1947	315.7	15.3	4.8	3.6 (3.9)
1953	417.1	60.1	14.4	2.5 (2.9)
1954	408.8	49.5	12.2	5.0 (5.6)
1959	478.8	45.5	9.5	(5.5)

Source: *Economic Report of the President,* 1960.

1. NSE figures are net of government sales, hence may be a little too small. There has been a substantial revision of these figures in recent years.
2. The figures in parentheses are according to the new definition.

Some of the problems of conversion do not show up in the aggregate data. Even within the defense program itself there are continual shifts involving conversion problems of the same order of magnitude as those which would be involved in substantial disarmament or even in conversion to "expensive" arms control. The shift which has taken place in the past few years from the wheel to the whoosh as the basis for military hardware, for instance, has created a substantial conversion problem within the defense industry of the same order of magnitude as that which might be expected in the shift-over from the present system to a plausibly expensive arms-control system. The current change-over temporarily created some mildly depressed areas, such as Michigan, but the economic impact of conversion has not presented itself as more than a minor national problem.

I am not arguing, of course, that conversion is costless, painless, and creates no problems, and least of all am I arguing that there should be no national policy about it and no organization to deal with it. I would argue indeed that this is a perennial problem, that even though the American economy is remarkably flexible and deals fairly well with this problem even in the absence of any governmental organization, there is a strong case for more positive social organization to deal with depressed areas and industries, whether these result from tariff changes, exhaustion of natural or human resources, shifts in technology or tastes, or changes in the defense industry. I argue also, however, that this is a manageable problem, and that it can be solved well within the limits of toleration which our value system imposes.

The ease with which the problem of conversion can be solved depends in no small measure on our ability to prevent depressions. It is dangerously easy for a free market economy with low levels of government expenditure to get into a vicious spiral of declining investment, resulting in declining incomes and profits, which lead to still another decline in investment, and so on. The remarkable resiliency of the American economy since 1945 by comparison with the 1930's can be attributed to the development of a number of "built-in stabilizers," as well as to a general expectation that government would intervene quickly to prevent a serious depression. Of these built-in stabilizers the sheer magnitude of the Federal budget is an important element. With a large over-all budget amounting to about one-fifth of the gross national product, with tax receipts amounting to an even larger proportion of disposable income, and with a tax system that is at least moderately progressive, general deflationary or inflationary forces in the private economy call forth an automatic counterforce in the public sector. Thus a deflationary movement in the private sector, due, say, to a decline in private investment expenditure or to a "buyers' strike" of consumers trying to increase their cash balances, is reflected in a decline in taxable income. With a system that is largely pay-as-you-go, this results in an immediate decline in tax receipts at both Federal and local levels.

There is also likely to be an increase in over-all governmental expenditure on unemployment insurance benefits, relief payments, agricultural price-support purchases, and so on. Government cash budgets rapidly become unbalanced: this results in an increase in the cash balances held by the public, and this is in itself an inflationary factor. It may not be enough to counteract the initial deflationary movement entirely, but it will slow down the deflation and hence tend to eliminate certain dynamic aggravations of the deflationary process. If in addition there are some deliberate policy measures, such as credit relaxation or tax reduction, a spontaneous deflationary force can easily be offset in principle, though in practice there are difficult problems involved in the timing of these changes. Similarly, if there is a spontaneous inflationary movement in the private sector, taxable incomes rise, government receipts rise and expenditures fall, and government runs a surplus which drains money out of private balances, thus reducing the inflationary pressure.

Thus, the critical question here is whether arms control will result in a sizable reduction in the over-all government budget. If we have what I have called "expensive" arms control, which seems most likely at the moment, with elaborate inspection systems and even an increase in conventional forces, the problem may not arise. The movement toward arms control, however, is more fundamental than a mere attempt to put back the clock of technology to the point where we can once more indulge ourselves in the luxury of war without the fear of annihilation. At some point in the development of a viable world social system, as we proceed from arms control to close organizational connections between opposing armed forces, or even as we proceed to a system of "absolute weapons" in which defense collapses altogether and unilateral disarmament begins to pay off, there may come a point where there is no payoff in the maintenance of expensive national armed forces and they will be dismantled. This may seem absurd to historians and political scientists who are not students of general social systems and who cannot usually imagine any social system beyond the present.

We know too little about social systems to predict their course, and there may be many possible dynamic paths to the world society—conquest, unions, agreements, tacit agreements, unilateral behavior, and so on. The possibility of "cheap" arms control must not, however, be left off the agenda, even though this is almost certainly not the next move. The problem of the reaction of the American economy to "cheap" arms control (for instance, total disarmament) is a question of more than academic interest, even though it is at the moment an "academic" question. It is important not only because it may someday happen and we should be prepared for it, but because the assertion that the American economy could not maintain its health without a large arms program is a widely held belief, not only by Communist propagandists (though this line seems at the moment to have been abandoned) but what is more important, by many Americans themselves, some of them in high places.

Suppose then, we look at a model of an American economy in, say, 1959, in which the national security budget has been virtually eliminated. The total government budget is still about 10 percent of the GNP. This is a situation surprisingly similar to that of 1929, as is shown in the following table:

TABLE 2

United States Nonmilitary Government Expenditure in Real Terms (in billions of 1959 dollars)

	TOTAL		AS PERCENT OF GNP	
	1929	1959	1929	1959
Federal nonmilitary expenditure	3.4*	8.1	1.8*	1.7
State and local government expenditure	17.4	44.3	8.9	9.2
Total nonmilitary government expenditure	20.8	52.4	10.7	10.9
GNP	203.6	478.8		

Source: *Economic Report of the President*, 1960.

* This figure is for total Federal expenditure, as military expenditure is not available separately. It would be of the order of 1.0 billion.

It may come as a shock to many people to learn that apart from national defense, the proportion of real product actually absorbed by government in the late 1950's was almost exactly the same as in the late 1920's, in spite of a more than doubled real GNP. Creeping socialism does not seem to have crept very far, outside the Pentagon, which is in terms of GNP the world's third largest nonmarket economy, with only Russia and possibly China exceeding it. There may even be something in Galbraith's thesis that the public economy needs to expand, arms control or no arms control. The question needs to be raised, therefore, as to whether a nonmilitary American economy in 1960 would be any safer from depression than in 1929 without the introduction of organizational machinery which we do not now possess. No definite answer could be given to this question without a good deal more study.* There are many important differences between now and 1929. The national debt is larger. We have pay-as-you-go taxes, which are a great stabilizer (before this, income taxes were paid on the previous year's income and so went up as a percentage of income when incomes were falling). We have social security, and also agricultural price supports, which for all their vices are also built-in stabilizers. Nevertheless, it is a moot question whether these devices are quantitatively adequate to deal with a sharp deflation. We may not expect anything like 1929-1932, but something like 1937-1938 would not be beyond the bounds of possibility.

It must be emphasized, however, that the purely economic problems involved in an adequate stabilization policy have been solved at the level of first approximation. We know roughly what to do, and still more roughly how much to do and when to do it. It would be possible, for instance, to increase the sensitivity of the built-in stabilizers at a lower level of government expenditure by such devices as automatic tax-rate reduction when national income fell, and a similar increase when it rose. It would be possible also to pursue more vigorous monetary policies. I am personally against this step, but this is an internal row among the economists. The important thing is that there are many ways of stabilizing (within limits of tolerance) the gross national product. There is an important unsolved problem regarding the extent to which this can be done without long-run inflation, and how the answer to this question is related to noncompetitive labor, capital, and commodity markets, but this, in a sense, is a secondary problem. To put the matter in a rather crude form: if we take 40 billion dollars of defense production out of the gross national product, where can we find another 40 billion dollars' worth of goods and services which can be absorbed without causing deflation? The answer is partly in increased household purchases as a result of tax decreases, partly in increased investment by businesses, partly by increased government expenditure in civilian uses, and partly by an export surplus created by foreign investment or foreign aid.

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* Such a study is to begin immediately under the auspices of the Center for Conflict Resolution at the University of Michigan, directed by Professor Emile Benoit of Columbia University, and financed by a grant from the Carnegie Corporation and a Ford Foundation Faculty Research Fellowship.

It is easy to find four numbers that add up to 40 billion. The trouble may be that it is too easy: there are too many alternatives, and we may be paralyzed for want of ability to choose among them, for the choice will involve political decisions which we are not well set up to make. Furthermore, the choice involves a mixture of technical and political decisions which are hard to unscramble. Thus the decision to take steps to stabilize the GNP and so expand other forms of product absorption by roughly the amount of decline in government military expenditure would be almost nonpolitical in the sense that there would be wide agreement and little conflict of interest about the objective. When it comes to allocating this increase among the various alternative methods of achieving it—tax reduction, debt increase, shifts in the tax structure, additional government expenditure on various competing activities (health, education, social security, conservation, public works, roads, flood control, and so on) and finally foreign aid and public investment abroad—the battle of interests is on, and there is no machinery to insure that the sum total of these various decisions adds up to just the right amount. I have sometimes thought of a device like a "government dollar," in which taxes shall be collected and budgets reckoned, and a variable rate of exchange (set by an economic policy agency analogous to the Federal Reserve Board) between government money and private money: the interests could fight out the truly political problems of allocation in government dollars, and then the stabilization agency could from time to time determine the aggregate amounts by setting a rate of exchange with private money as stabilization policy demanded. The suggestion may be quite impracticable: it is offered only as an example of the kind of change in our existing economic institutions which a stabilization policy on a small government budget might require.

Perhaps the greatest immediate threat to a rational stabilization policy is the still common attitude toward the national debt which sees it as a great burden and wants to strain to reduce it. There is sometimes a case for monetizing part of the national debt (paying it off with newly created money). There is hardly ever any case for paying it off by running a budget surplus, except in periods of strong inflation of private origin. A sharp reduction in the total government expenditure will be seized on by the economic puritans as an opportunity to pay off the national debt by not reducing taxes and so producing a substantial budget surplus. Such a policy would almost certainly be ruinously deflationary, and would cause depression and prevent conversion.

The problem of designing an optimum rate of economic growth is even more difficult than that of stabilization, and arms control may well raise serious questions—questions, however, which again are capable of serious answers. Economic growth is maintained by devoting resources to the accumulation of things, skills, and knowledge, and of these knowledge is the greatest. National security expenditure generates, as an important by-product, all three of these forms of accumulation. It results in the accumulation of buildings, roads, installations, and stocks of many commodities, many of which have potential civilian uses. It results also in the accumulation of skills in the population by dragging men out of their homes and teaching them crafts, trades, and professions, as well as the arts of dealing death and destruction. Finally, and this is becoming an increasingly important aspect of military expenditure, it organizes research on a scale of expense unknown to the civilian world. The Pentagon and Hollywood seem to be the only two places in our society where extravagance is cultivated as a virtue. Therefore, when research is hitched to the military rocket, it proceeds at a pace far beyond that of the civilian and merely peripatetic philosopher. I am quite willing to deplore this fact, but I am forced to acknowledge it. Perhaps the biggest social invention of the mid-twentieth century was the RAND Corporation, which perpetually makes obsolete the institution that fathered it.

Here again the economic problem is almost trivial. If we spent as much on research and training for human welfare as we spend for defense, it is hard to believe that the results would not be even more dramatic. If all science could be pursued without the smell of brimstone, and if all secrecy were abolished, how much more quickly, and joyfully, would knowledge grow. The problem is essentially one of the political consciousness: can we organize, through both private and public organization, the same kind of effort, or an even greater effort, for pure knowledge, useful skill, and human betterment than we can for the road to doomsday? If we cannot, it can only be because of a failure of the imagination, of a lack of clear purpose, and a poverty of symbols. But if we lack these things, we do not deserve anything better than doomsday.

In spite of the fact that the main theme of this paper is the domestic implications, we should take a brief glance abroad, for several reasons. One is that the domestic implications of arms control for other countries may be different from what they are in the United States. In Russia, for instance, though exact information is not available, the proportion of the gross national product going into national security is considerably larger than in the United States—though in an economy that is substantially poorer. National security is correspondingly a much greater economic burden. In the United States the marginal significance of the arms dollar is in the realm of a little more or a little less luxury; in Russia it is much closer to basic comfort, and in India it is close to sheer necessity. The Russians correspondingly have a greater incentive than we do toward "cheap" arms control, and this may explain something of their (and our) attitudes. In really poor countries like India, Pakistan, and China, arms expenditure literally snatches life from the starving: there is an enormous economic interest in cheap security.

Indeed, economic development is such a tender plant in its early stages that a heavy arms budget may condemn a poor country to stagnation. The problem is complicated, however, by the fact that at least in its early stages arms control will probably not operate as a world system, and there will be sub-systems within it (such as the rivalries between India and Pakistan, Israel and the Arab world, Cuba and the Dominican Republic) which may escape the general system of arms control and yet may be very costly to the participants.

Another reason for looking at the world economic scene is that one of the domestic implications of arms control (at least, of "cheap" arms control) for the United States may be a release of resources for investment and development abroad. This has implications for the reduction, or increase, of world tensions which may be relevant to the success or failure of arms control itself. It is important, too, in the moral mythology of disarmament: the plea that disarmament would release large resources for economic development and for raising standards of life in the poor countries is a powerful part of the motivation which drives ordinary decent people toward it, even if it does not have much appeal for political realists and those who direct the destinies of states.

Like other myths, this also embodies an important half truth. It is true that disarmament (or cheap arms control) would release resources which could indeed be used for this purpose. They do not have to be used for this purpose, however, and there is no guarantee that they would be. If we assume that no method of domestic stabilization is acceptable, other than manipulating the export surplus, then of course the stabilization program which followed cheap arms control would involve extensive gifts and investments abroad. It is perfectly possible, however, to draw up a domestic stabilization plan which involves no increase in the export surplus and no contribution to the development of the rest of the world. The plain fact is that, beyond a certain point of profitable investment abroad, the increase in the American export surplus involves a real cost to Americans, in terms of consumption foregone, or what may be more serious, domestic growth impaired. Empire, whether political or economic, has frequently involved a high cost to the imperial power. In terms of per-capita income, for instance, the countries that stayed at home and minded their own business (like Sweden and Switzerland) have frequently done better than those who have spread their flag and their subsidies around the globe, like Portugal and Spain. The history of the technological revolution shows that man may squeeze a hundred dollars out of nature with the effort that he spends on squeezing one dollar out of conquest. The polite struggle to abandon empire, which is so characteristic and almost embarrassing a phenomenon of the modern world, may not be unconnected with a half-conscious realization that whatever may have been the case three hundred years ago, empire does not pay today. There may be exceptions to this rule: the Russians have probably got something out of East Germany, though it will be surprising if they get anything out of Cuba and Guinea. The whole subject needs much more careful study than has been given to it.

The impact of aid programs, both on the development of the recipients and on the level of world tensions, needs careful study. On the one hand, we must avoid the naïve expectation that progress and peace can be bought by the indiscriminate shoveling out of billions. On the other hand, we must equally avoid the niggardly naïveté of the xenophobes and economic isolationists. Without some acceptance of world responsibility on the part of the rich and powerful countries, it is difficult to visualize a successful system of world peace. Yet there is also a trick of being able to accept gifts, advice, and support without a collapse of internal morale and self-respect. It may be more blessed to give, but it is often a lot harder to receive. Nevertheless, this skill can be learned, as Japan has shown in regard to knowledge and Puerto Rico shows in regard to both things and knowledge. The problem of how to make the poor countries rich requires a degree of serious research and attention at least comparable to that put into the road to doomsday. If arms control can release this kind of resource, in the long run this may be its most important contribution.

The economic consequences of arms control are perhaps the easiest to trace of all the consequences for the social system. The impact of arms control on the other institutions and patterns of behavior in society may eventually be even more significant, but we have hardly begun to think about these deeper implications. Nevertheless, they exist—for religion, for family life, for ethics, for art, for culture in all its many dimensions, and for politics. This is true because arms control is the beginning of a great revolution in human affairs. It may look like an attempt to get national security cheap, or to safeguard the institution of limited war, or to prevent a nuclear holocaust—and it is all these things. However, arms control is only the beginning of a process of evolution of social institutions which leads to the abolition of war and the establishment of the institutions of permanent peace, even though we cannot now foretell in detail what these will be. A specter is haunting the chancelleries and the general staffs, more frightening perhaps than that which Karl Marx invoked in 1848; it is the specter of Peace—that drab girl with the olive-branch corsage whom no red-blooded American (or Russian) could conceivably warm up to. She haunts us because we cannot go back to Napoleon, or to Lee, or even to MacArthur: the military are caught in an implacable dynamic of technical change which makes them increasingly less capable of defending the countries which support them, except at an increasingly intolerable cost. The grotesque irony of national defense in the nuclear age is that, after having had the inestimable privilege of losing half (or is it three quarters, or all?) our population, we are supposed to set up again the whole system which gave rise to this holocaust!

We are, however, totally unprepared for peace. We have never had peace, and it may be forced upon us before we really want it. One can only, in the spirit of Newton's *Opticks*, raise some queries. What, for instance, can hold society together in the absence of an external threat? What are the institutions which can embody "conflict control"—that general social system of which arms control is only a special case? How do we catch the disintegrating dynamic processes in society—the epidemics of hatred, the infectious images of falsehood, the powerful symbols which lead to destruction—and stop them, by education, by quarantine, by counter-eloquence, before they spread too far? How do we give the individual an image of self-respect, of identification with some larger group, without permitting the development of images of hatred and intolerance? How do we preserve the richness and variety of cultural differences in a world of rapid communication and peace—how, in other words, do we preserve the very real virtues of nationalism in a warless world? How do we prevent the great latent social processes (population growth, emotional hysteria, charismatic leadership, mistaken images of social fact) from carrying societies to poverty, factionalism, and decay? More difficult perhaps, how do we prevent boredom, how do we preserve danger, excitement, and a sense of high purpose? How do we deal with sadism and masculinism, masochism and femininism, the strut and the swagger, the cringe and the death wish? How do we release people from the crippling "binds" of ambivalence, and release their creative potential? How do we raise children in a warless world? What kind of ethic do we inculcate, and what are our defenses against its corruption? What rituals shall we have, and what heroes? How can we prevent the corrupting influence of wealth, luxury, and the treacherous ability to satisfy the flesh? Peace, it is clear, insinuates her soft fingers into every nerve of life. We have dreamed of utopia, and secretly been thankful that it is only a dream. Now we are going to be compelled to think about it, and think hard and long, for we may be forced into it by the absence of any alternative but doomsday.

BIBLIOGRAPHICAL NOTE ON RECENT LITERATURE

The recent literature on this subject is almost entirely confined to pamphlets and journals; there is a startling absence of formal or academic studies. Many of the peace groups have published pamphlets relating to the economics of disarmament: see, for instance, *If the Arms Race Ends* (two papers by Albert L. Gray, Jr., and Byron L. Johnson, Board of World Peace of the Methodist Church, 740 Rush Street, Chicago 11, Illinois); *Fact Sheet: Economic Consequences of Disarmament* (Committee for World Development and Disarmament, United Nations Plaza, New York, October 1959); see also publications by the Friends Committee on National Legislation, 245 2nd Street N.E., Washington 2, D.C., and by the Women's International League for Peace and Freedom, 2006 Walnut Street, Philadelphia 3, Pennsylvania.

Some of the more "neutral" policy research groups have also published pamphlets: the National Planning Association (1606 New Hampshire Avenue N.W., Washington, D.C.), Joint Statement, *Can the American Economy Adjust to Arms Reduction* (4 January 1960); and the Committee for Economic Development (711 Fifth Avenue, New York 22, New York), *The Defense We Can Afford*, by James F. Brownlee. The Senate Subcommittee on Disarmament of the United States Senate Committee on Foreign Relations published *Hearings* (1957), of which Parts 8, 9, and 13 are particularly relevant.

Periodical and newspaper articles include: Emile Benoit, "Will Defense Cuts Hurt Business," *Michigan Business Review*, March 1957; Seymour Harris, "The Economics of Disarmament," *Current History*, October 1957; and "Can We Prosper Without Arms," *New York Times Magazine*, 8 November 1959; Senator Hubert H. Humphrey, "After Disarmament–What?" *Think*, January 1960. *The Nation* had a special issue, "Economic Hazards of Arms Reduction," 28 March 1959.

BERNARD T. FELD

Inspection Techniques of Arms Control

Introduction

THIS AUTHOR regards it as axiomatic that most significant arms-control arrangements require for their successful achievement the solution of some technical problems. The scope of the technical problems includes more than just the working out of mechanical inspection devices and the definition of the role of control and verification agencies. Satisfactory technical solutions require as well explicit attention to problems of devising measures for justifying and enhancing confidence in the arrangement, for minimizing tensions and conflicts growing out of it, and for encouraging the development and extension of accommodations into other aspects of international life so as to insure a continual increase of the mutual security of nations.

It is not intended to imply that arms control is entirely or even predominantly a technical problem. Clearly, the achievement of any significant form of arms control involves agreement on issues which are at the same time political, economic, strategic, military, social, historical, and legal as well as technical. Nevertheless, the solution of the technical problems is certainly a prerequisite to the achievement of an acceptable agreement, and the form of the available solutions is crucial for determining the possible types of accommodations.*

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* The solutions may be simple for some agreements, such as the recent treaty to insure only the peaceful use of the Antarctic regions. Unfortunately, this simplicity in this case applies to an arrangement which yields little in the way of arms control. On the other hand, the degree of technical complexity is not necessarily a measure of the degree of significant disarmament involved in an agreement. Thus, while there are many arguments to justify the continued pursuit of a nuclear-weapons test-ban agreement, despite the great (and growing) complexity of the system being devised to monitor it, it can hardly be said that the cessation of testing will reduce the arsenals of the great powers to any appreciable degree.

Nor can we automatically equate arms control with disarmament. Indeed, as will be detailed in the next section, "arms control" may be defined as comprising the entire spectrum of possible arrangements—from armed "deterrence" schemes, which may require the building up of certain types of armaments, all the way to universal disarmament—with the common feature, however, that these arrangements are adopted as part of a conscious effort to decrease and eventually minimize the likelihood of uninhibited armed conflict.

But it would be less than candid of me not to admit to the conviction that the possible solutions that have the greatest interest, now and in the foreseeable future, lie more in the direction of disarmament than in deterrence through mutual terror. This conviction is based mainly on two considerations: first, I feel that any system, no matter how ingeniously contrived or how meticulously constructed and balanced, is inherently too dangerous if it contains within it the possibility that a single nation, through unilateral action, can touch off a rapid chain of world-wide destruction. The instability might be triggered by a madman bent on international murder and suicide, or by a military or strategic miscalculation, or by a fortuitous series of accidents of inherently low probability; but the consequence could in any case be a catastrophic and irreversible holocaust.*

Systems involving appreciable controlled disarmament, such as those discussed in the article by Jerome B. Wiesner,[2] if they are attainable, have the important feature that there is of necessity an appreciable time lag between the inception of an armed conflict and the accumulation by the antagonists of stocks of nuclear weapons sufficient to cause the type of unacceptable damage referred to above. This time is available for the consultation, negotiation, and external intervention which might stop the conflict short of a catastrophic conclusion.

Universal disarmament without controls, however, may be excessively unstable in so far as it would encourage evasions and military adventuring. It would appear that the appropriate arms-control arrangements may lie somewhere between the extremes, possibly closer to the stabilized deterrence systems at the beginning, but evolving, as rapidly as feasible, in the direction of disarmament under the control of effective international organizations.

The second consideration pointing toward the importance of disarmament measures is essentially a political one. The great powers and their leaders are all publicly and firmly committed to the aim of comprehensive disarmament.* Talks are now going on, and, regardless of any mental reservations either side may harbor, there is a firm moral commitment to continue to seek measures leading to the elimination of armaments, together with some kind of control.

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* This problem is discussed in detail in the article by Herman Kahn.[1]

If eventual comprehensive disarmament is the stated policy of the major powers, the specific steps and even the avenues of approach have remained exceedingly vague. Beyond the general outlines of the Russian and American approaches,[4, 7] practically nothing has been published on the details of proposed disarmament measures.† More information is available on the history of disarmament negotiations,[8] and a number of general studies have been carried out in recent years by the United States Senate Subcommittee on Disarmament.[9] But the most comprehensive published study of techniques in this field remains that of Melman,[10] carried on outside the government.

In one field, the monitoring of a possible ban on the testing of nuclear weapons, a great deal of information is available.[11] Although such measures can hardly be said to constitute serious disarmament,** the difficulties are in many respects characteristic of the types of technical problems which will be encountered in future arms-limitation negotiations. Thus, it is possible to make a comprehensive list of the problems which need to be solved and to outline the research program required, as has been done in the report of the Berkner Committee.[12] As a result, it is clear that the technical problems raised in the test-ban negotiations, and their suggested solutions, appear formidable indeed (see reference 1), so much so that it is worth noting what has been pointed out in some detail by Szilard,[13] that it might be possible to settle for a greatly simplified inspection system by placing a greater reliance on human, in contrast to purely physical, devices for inspection.

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* "I want to . . . emphasize that the United States is prepared to explore every possible avenue to find a way toward general disarmament" (Dwight D. Eisenhower[3]).

"The Soviet Government . . . has come to the firm conviction that the way out . . . should be sought along the road of general and complete disarmament" (Nikita S. Khrushchev[4]).

"Our aim is to move forward by balanced stages towards the abolition of all nuclear weapons and . . . the reduction of all other weapons . . . to levels which will rule out the possibilities of aggressive war" (Selwyn Lloyd[5]).

"France believes that . . . peace . . . involves the limitations and control of armaments by both camps" (Charles de Gaulle[6]).

† Enough has emerged, however, to make clear the serious difference in emphasis on the role of control and inspection. Thus, Khrushchev says[4]: "If disarmament is comprehensive and complete, then *upon its attainment* control shall likewise be general and complete" (italics ours). Compare this statement with the official Western proposal at Geneva[7]: "The task of the . . . conference shall be to work out measures of general disarmament, which can only be attained by balanced, phased and safeguarded agreements."

** This fact may diminish their significance, but not their importance!

The author of this paper has participated in an effort to summarize the status of research, as of March, 1960, relating to the technical problems of arms control and to identify areas in which further research is most needed. This study was undertaken by the Committee on the Technical Problems of Arms Limitation of the American Academy of Arts and Sciences, as part of a broad program of the Institute for International Order aimed at stimulating research on Peace Problems. The discussion which follows draws liberally on the results of this study.[14]

Characteristics of Arms-Control Agreements

As previously indicated, our definition of arms control is intended to encompass all possible arrangements designed to decrease the probability of international armed conflicts, from unilateral "deterrence" measures to universal disarmament requiring stringent international controls.

There are many factors which are important in relating what is desirable to what is feasible. Thus, the technical solutions which are relevant to a given arms-control negotiation are determined to a large extent by the type or level of international agreement which is politically negotiable at the time. But what is negotiable is of course strongly influenced by what is regarded as desirable, and this, in turn, is influenced by other considerations, including the strategic advantages which might be gained or lost by the control scheme, the costs and other economic implications of the proposed system, and the relationships of the contemplated measures to the ideological positions and self-images of the nations involved.

Still, provided the political and other such constraints can be reasonably well defined, the problem of the arms-control "technician" is to choose from among the possible solutions, or to devise new ones, in such a way that the *system as a whole* is the best which can be achieved—due account being taken of the whole set of pertinent criteria, including capabilities and effectiveness, limitations, cost, acceptability, and a number of other criteria relating to the impact of the contemplated agreement on the further development of arms-control measures and the growth of international law and of enforcement agencies.

Since the end of World War II, a number of proposals for arms-control systems have been explored on the international level. These include the Acheson-Lilienthal-Baruch plan[15, 16] for the international control of all nuclear-energy activities, the Rapacki plan [17] for "the establishment of a denuclearized zone in Central Europe," proposals for eliminating the possibilities of surprise attack[18] (including the "open skies" proposals), and the latest Russian proposal[4] for general and complete disarmament in four years. On the whole, none of these plans has achieved the required balance between the technical and the other considerations; the Western plans have tended to overelaborate the former at the expense of the latter, while the Eastern plans have generally exhibited an almost total disregard of the technical problems.*

Among the criteria for acceptability of arms-control arrangements, those which relate to stability and to the elimination of sources of tension are perhaps the most difficult to satisfy. Although the technical requirements often appear to demand extensive controls, it is important to recognize that the more elaborate the system, the more numerous are the potential sources of friction, and the greater is the likelihood of increasing tensions, rather than decreasing them.

This problem represents just one of the reasons why considerable attention is being devoted to arms-control measures which rely as little as possible on explicit agreements among the powers. It appears that a great deal of effective arms control (in contrast to arms limitation or reduction) might be achieved through unilateral actions on the part of the great powers. However, for such actions to be effective, it is necessary that the motivations behind them should be so obvious as to render them acceptable without explicit agreement.

This category of arms control includes most of the deterrence schemes which emphasize the development of invulnerable retaliatory weapons at the expense of first-strike capabilities. As pointed out by Schelling,[19] there are many simple unilateral actions which can contribute to the stability and effectiveness of such systems. A more elaborate scheme, aimed at the achievement of stability in an armed world, has been explored by Szilard.[20] This approach to arms control emphasizes techniques of self-inspection. A self-inspecting arrangement is one in which the burden of proof of compliance rests with each of the parties to the arrangement; it is possible only in so far as the incentives for compliance and for convincing the potential antagonists of this compliance exceed the gains which could possibly accrue from a violation.

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* Thus the West accuses the USSR of desiring disarmament without control, and the Russians counter that they "are in favor of genuine disarmament under control but . . . against control without disarmament."[4] Neutral observers of a cynical bent have contended that in fact practically all proposals so far have taken into consideration only strategic and ideological problems, and were in effect designed to increase the military and propaganda position of whichever side advanced them.

Whether it will also be possible to develop and utilize techniques of self-inspection in agreements involving an appreciable degree of arms reduction is a question whose answer will require much more study.

General Techniques for Inspection

The methods available for the inspection of various possible agreements for arms control have many common features, so that a relatively small number of techniques can be utilized, by varying some of the details, in the control and limitation of many types of weapons and delivery systems. These general inspection techniques can be separated into physical, records, and nonphysical inspection.

A. *Physical inspection* comprises those techniques of direct surveillance and verification of specific weaponeering activities which depend on physical contact with the activity in question, or with a direct by-product of this activity. These techniques, which are those usually associated with control systems, include:

1. *General (ground) surveillance* of factories, military installations, harbors,* transportation centers, airports, etc., aimed at detecting either forbidden production activities or unusual movements or deployments indicating preparation for unusual military activities. Studies of such controls have been reported by Melman,[10] and in connection with the Geneva Conference on Preventing Surprise Attack.[18]

2. *Inspection of known facilities* for the verification of compliance with agreements. These techniques apply in an operating system for arms control, and are designed to ascertain that known and normally permissible laboratories and factories are not clandestinely engaged in military development or production activities. Inspection problems in this category have been studied extensively in relation to the control of plants producing fissionable materials,[21] but there

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* In this category we include the sea as part of the "ground." This relates in particular to agreements that contemplate control of the numbers and distribution of nuclear-powered submarines.

has also been some study relating to the control of other arms systems.[10]

3. *Aerial and outer-space reconnaissance and surveillance* for illegal activities. There are three permutations of this application as it affects the observer and the observed:

(a) Surveillance of objects on the ground by air-borne or space-based systems, including aerial reconnaissance[10] and, looming on the horizon, reconnaissance satellites. Such surveillance aims at detecting significant changes in the normal pattern of activity, such as might accompany preparations for a surprise attack. The U-2 incident has resulted in considerable open discussion of the uses and capabilities of these techniques.

(b) Surveillance of objects in the air by ground-based systems, comprising radar systems for the observation of missile launchings and possibly, air traffic control.[22] This category of techniques is of interest mainly for possible arrangements involving restraints on the development of long-range missiles and satellites, with surveillance of launchings included as part of the agreement.

(c) Surveillance of objects in the air or in space by air-borne or space-based systems relates to the same functions as discussed in paragraph (b). However, additional detection possibilities are available above the atmosphere, such as infrared detection, and these systems may have special applicability with respect to the detection of missile launchings and the detection of outer-space testing of nuclear weapons.

4. *Special techniques for the detection of radioactivity* from the ground, in the air, or in the seas are specifically applicable to problems of nuclear weapons production and test detection. Almost all nuclear materials activity — production or use — gives rise to some residue of radioactivity; since the detection of the products of radioactive disintegrations provides an extraordinarily sensitive inspection device (by the use of appropriate techniques, literally a single nuclear disintegration can be distinguished), many methods can be conceived for the detection of those hidden activities which require the disposal of some radioactive substance at some stage.

5. *Problems of maintenance of weapons stockpiles* are worthy of special attention since the difficulty of discovering nuclear weapons (and missiles) hidden before the institution of an inspection system is generally regarded as the major technical obstacle to the adoption of agreements contemplating drastic reduction of armaments. In particular, this requires investigation of whether there are aspects of the maintenance of secret stockpiles which require activities sus-

ceptible of detection. Such studies appear to call for highly classified information.

B. *Records inspection* involves the detailed analysis of industrial and governmental activities by methods with which there is considerable experience,[10] although most of it is applicable to the governments and societies of the West. There are two approaches to the examination of plant and agency records:

1. *Budget and expenditure inspection* may provide a means of verifying the nature and extent of declared activities, and possibly of detecting the existence of undeclared activities of large scope, although a number of examples exist where the expenditure of large sums for military purposes was kept relatively secret (e.g., the Manhattan project during World War II).

2. *Production and inventory records* are subject to verification by strict accounting procedures. There are probably not many difficulties associated with the verification of operations and production after the adoption of a control agreement. But the accurate estimation or verification of past production presents a major problem, involving the consistency, authenticity, and completeness of past records, which may be crucial for determining what kind of arms-control agreements are possible. The solution of this problem could be one of the keys to the future prospect for disarmament.

C. *Nonphysical inspection* covers those techniques of control, surveillance, and verification primarily involving the use of human agencies. In view of the inadequacy of physical and records inspection techniques with respect to at least two crucial problems — namely, the possibility of appreciable stockpile accumulation before the initiation of the agreement and the difficulty of detecting research and development activities which could result in major breakthroughs—it is important to seek other means of verification of compliance with agreements and of control over clandestine activities. The first systematic appraisal of nonphysical techniques, as far as we know, is due to Bohn[23]; specific applications have since been suggested in a number of instances.* Nonphysical inspection techniques have received very little study to date. Subjects of obvious interest for future study include:

1. *Utilization of the general population for information* on compliance and for detection of clandestine activities. This approach raises questions of the extent of supranational loyalties and the possi-

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* Such as Melman's "inspection by the people"[10] and Szilard's plans for test-ban control.[13]

bilities for their enlargement, the availability of secure channels for the transmission of information to an outside agency from inside a closely controlled nation, and the evaluation of the validity and reliability of information received. Beyond some very preliminary studies,[10] practically no information is available.

2. *Utilization of key people* for the location of key activities. For this approach to be usable, it is necessary first of all to determine who are the key people with respect to any activity of possible interest to the control agency. If we assume this information, it is then necessary to determine which individuals are likely to know of or to be involved in clandestine activities and to devise techniques of interrogation and surveillance which are most likely to elicit information concerning such activities. As a possible means of obtaining information, such special psychological testing devices as depth interviews, polygraphs (lie-detectors), drugs, hypnosis, etc., invite study, if only because so little is known. At the same time, it is necessary to pay close attention to the necessary restraints imposed on the use of such devices by constitutional requirements and by the general rules of conduct which should be practiced in civilized nations.

3. *A census of the activities of specialists* could provide a means of detecting when a significant sector of the scientific community disappears from peacetime activities. The difficulty with such a census is that it requires full information, including knowledge of those who have gone directly from school into secret laboratories and who are accordingly not known to the scientific and technical community through their professional work. Hence, the effectiveness of this approach may depend on the availability of complete records of student interests and activities in institutions which provide advanced training, as well as the provision of means of tracing individuals of possible interest to the inspectorate.

4. *Establishment of an international intelligence network* would probably be necessary for the institution of any comprehensive control system. Although considerable experience exists with national agencies, there is neither experience nor precedent relating to the use of such agencies for the detection of violations of international agreements.

Common Problems of Inspection Systems

The specific form of inspection system required to implement a given agreement will depend on the constraints imposed by the terms of the agreement as well as on what is to be inspected. However, common to all inspection systems will be certain problems, such as the use of sampling techniques to accumulate and evaluate relevant data, the development of methods of organization and staffing of inspectorates to insure maximum effectiveness, and the devising of means for insuring the continued maintenance of this maximum effectiveness.

A. *Statistical sampling techniques* are required for any of the inspection methods discussed in the preceding section, since it is manifestly impossible to observe every act, record, and person involved in a widespread industrial complex. There are two sides to the sampling problem, however, and the methods they require may be quite different. On the one hand, if the problem is to verify permitted activities in disclosed facilities, the methods of sampling are relatively standard, having been worked out in connection with such well-studied industrial problems as quality control and inventory maintenance.[10] On the other hand, the design of techniques to search for undisclosed facilities and weapons or for clandestine activities in a sovereign nation, part or all of whose officials and nationals may be bent on evading the agreement, presents a relatively virgin field. The evolution of appropriate sampling patterns and procedures is in large measure an operations-research problem, but it also involves many aspects of "game theory," since the appropriate techniques may depend on decisions concerning the strategic aims of the inspectorate.*

We need information directly relating to specific control systems, but there is also need for a more theoretical approach through mathematical models which treat in a general way statistical sampling in an evading population under various assumptions concerning its behavior patterns.

B. *The organization and staffing of the inspectorate* presents problems which are critical for the success of any control agreement. It is necessary to provide for supplementary functions of a positive, constructive nature if the inspectorate is to attract and retain personnel of a sufficiently high calibre to enable it to perform its supervisory tasks with the requisite ability and efficiency. Such additional responsibilities, if appropriately designed, can also help to minimize frictions between the inspectorate and the host countries, especially if they develop vested interests in the successful operation of the control system for the countries involved.

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* Is it better to let the evaders know (publicly or privately?) that their evasion has been detected, or to keep this secret, etc.? A start has been made on the study of some of these problems, in and out of the government, but these studies have not been made public and this author does not know whether they are being continued.

C. *Maintenance of the effectiveness* of the inspectorate requires more than just the provision of interesting and useful supplementary functions. Research on inspection problems, especially on possible means of evasion, will be required to perfect the inspection system. Besides, an inspectorate will be in a much better position to fulfill its functions and to anticipate new developments if, as a result of its own research, its knowledge of a given weapons technique is at least as advanced as that of any of the nations involved.

Research on inspection techniques and on the detection of possible evasions might well be instituted by the various powers involved, on a unilateral basis, before the achievement of an agreement. Such research, if properly balanced between studies of evasion possibilities and detection methods, might help delineate the possible fields of agreement and might enable the negotiators to enter into the discussions with reliable prior information relating to detection and inspection capabilities. Such a situation never has prevailed in international negotiations on arms controls.

Some Examples and Applications

The possible use of the available control techniques, singly or in combination, is best illustrated by a consideration of the specific control schemes which at one time or other have been considered seriously enough to receive more than a superficial study. Only suggestions made after 1945 are included, since only these could take into account nuclear weapons and modern delivery systems, but it is by no means certain that some of the studies carried out by the League of Nations may not have relevance.

A. *The Acheson-Lilienthal plan*[15] was devised as a means for controlling nuclear weapons through the prevention of their production and development beyond the 1946 level. Since at that time no nation other than the United States had facilities for the production of weapons materials, it was possible to adopt a simple and unsubtle technical solution for achieving complete control. The plan was to vest in an international agency the sole right to engage in any activity relating to nuclear energy. All nuclear plants and related activities (the mining of uranium, chemical processing, etc.) were to be constructed, operated, and controlled by the international agency.

The plan, especially as elaborated by Baruch,[16] involved such unprecedented infringements on national sovereignties and contained possibilities for such all-pervasive outside controls over important aspects of national economies that it was almost inevitable that it should be rejected by the USSR.* In fact, the plan may be taken as a classic example of the perfect "technical" solution which is, however, rendered useless by the failure to take sufficient account of the political, economic, and psychological realities. Of course, at the opposite extreme is an oft-repeated (pre-1955) Russian proposal of a treaty banning nuclear weapons.†

The more recent discussions of nuclear-weapons limitation have, on the one hand, reflected a growing realization on the part of the USSR that limitations without effective controls are unacceptable to the West and, on the other hand, a growing scepticism in the United States relating to the possibility of finding adequate technical measures for detecting treaty violations. This scepticism has lately been heightened owing to the difficulties of devising an evasion-proof agreement for banning bomb tests, but for many years it has pervaded every discussion of a reduction of nuclear-weapons stockpiles. But if for some people these uncertainties have tended to discourage the exploration of possible control arrangements, the reaction of others has been to seek alternative verification techniques and to study more intensively some nonphysical inspection measures.

B. *Production controls and the Nth-country problem.* The search for techniques for the control of nuclear weapons has been intensified as a result of the growing realization on both sides of the importance of impeding the further uncontrolled spread of nuclear-weapons capabilities.[24, 25] One result has been an enhanced interest in the utilization of international organizations, in particular the International Atomic Energy Agency (IAEA), in place of the heretofore prevailing systems of bilateral agreements, as an effective means of aiding in the development of nuclear-power capabilities while at the same time maintaining a reasonable international control to prevent the diversion of fissionable material into weapons production.

Although the charter of the IAEA, established in 1957 as an Agency of the United Nations with headquarters in Vienna, contains provisions for a number of controls aimed at preventing the diversion of fissionable materials, there has been a considerable reluctance on the part of some of the signatory nations to sanction the setting up of an effective control system. Nevertheless, the IAEA organization has shown an increasing interest in such controls, and the Agency's Governing Board appears to be showing some willingness to sanction moves in this direction.

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* This conclusion is perhaps one of hindsight. On the other hand, there is a serious question, in view of what is now known about the internal politics of the USSR in the late 1940's, that any control plan at all would have received serious consideration.

† This remark does not apply to proposals for an agreement to renounce the *first use* of nuclear weapons. Such proposals represent, in fact, a good example of possible self-inspecting arms-control arrangements.

The powers of the IAEA which could be applied to controls include[24]: the right of approval of facility designs, the responsibility for establishing health and safety measures, the ability to require adequate production records and reports, the responsibility to prevent diversion of fissionable material during and following processing, and the right to terminate assistance in the event of noncompliance with IAEA regulations. The techniques available and the measures which could be taken by control agencies have been studied in considerable detail in this country (and by the other nuclear powers); further study under the sponsorship and support of the IAEA is in progress in many countries. A detailed discussion of control measures was given in testimony in connection with ratification by the United States Senate of the Statute of the IAEA.[26]

C. *The Melman study*[10] of "Inspection for Disarmament" represents the most comprehensive published investigation of problems and techniques applicable to the enforcement of agreements for the partial or complete prohibition of nuclear weapons and the means of their delivery. Most of the eighteen papers comprising the study assume the existence of an agreement, including a provision for the unhindered access by an international inspectorate to facilities inside the signatory nations. However, the United States has been taken as the prototype nation to which the inspection techniques are specifically applied.

These papers, which cover the whole range of inspection problems, include: direct physical surveillance by aerial inspection methods, the detection of underground nuclear explosions, the detection of high-altitude missile tests, inspection for the production of agents of biological warfare, the direct inspection of factory operations, the use of fiscal and records inspection, as well as problems of psychological inspection, especially those relevant to the utilization of national populations for uncovering clandestine activities. Also included are interesting studies of past evasions of arms-control arrangements, in Palestine under the British mandate and in the Weimar Republic, as well as studies of possible techniques for evading the agreement under consideration made by "evasion teams" constituted for this specific purpose.

In his analysis of the results of the studies, Melman, while taking cognizance of the possibilities for systematic evasion inherent in many of the proposed inspection techniques, adopts the position that a combination of many techniques can serve to reduce to an essentially negligible level the net probability of significant evasions of the agreement by any single nation. However, this conclusion is also based on the assumption of a successful utilization of the technique of "inspection by the people," some possibilities of which are explored in the study.

It is of course possible to quarrel with this conclusion, to question the relevance in the present state of international relations of some of the controls envisaged, to point to differences between the American and Russian societies, especially as regards inspection problems, to urge greater attention to the interactions between different control measures, etc. But, such criticisms notwithstanding, this is a bold and imaginative first attempt, which, by bringing into the realm of public discussion the serious problems whose solutions are required for comprehensive disarmament and especially by calling attention to the importance of nonphysical inspection techniques, has made a major contribution to the study of arms control.

D. *The prevention of surprise attack*[18] is an aspect of arms control, of greatest significance in the absence of controlled arms limitation or in an interim period during which armaments are being reduced. As examples, the Rapacki plan and the "open skies" proposals are aimed at the reduction of surprise-attack capabilities and at the provision of mutual assurance concerning the peaceful intentions (or the contrary) of both sides.

Such assurances are especially important in a situation such as the present one, in which both sides rely for the maintenance of the peace on a mutual recognition of the effectiveness and readiness of deterrent forces. These assurances will remain important as deterrence systems become more powerful and more invulnerable, even in the absence of any but the most tacit of international arrangements.[19] On the other hand, their existence can contribute materially to the easing of tensions and to the establishment of an atmosphere of relative trust in which more inclusive agreements may become possible.

At the "surprise attack conference" of experts from the East and the West,[18] held in Geneva toward the end of 1958, no discernible progress was made toward agreement on prevention of surprise attack, owing to the participants' inability to agree on terms of reference. Nevertheless, the conference served at least to focus attention on a number of serious and difficult technical problems, of which we single out just one in the following brief discussion.

It is clear that the development of submarines of unlimited range and of submarine missile-launching systems (i.e., POLARIS) capable of firing nuclear weapons from under the sea, introduces new dimensions into the surprise attack problem. The control of such weapons-delivery systems depends on the ability to control the submarines. Two aspects of the problem need to be considered. On the one hand, submarines, like bombs and missiles, can be stockpiled, and the detection of their storage (for example, in remote locations on ocean bottoms) and knowledge of the numbers stored raise serious questions; however, these do not appear to be as difficult as those associated with the problem of a nuclear-weapons stockpile. On the other hand, the problem of locating submarines in operation, or even of forming a reasonably accurate estimate of their numbers, is also a formidable one, although it appears possible to conceive of systems of surveillance of major ports and straits, by using appropriate underwater location techniques, which might serve to enforce an agreed limitation on the number of active submarines without necessarily requiring a detailed knowledge of their location.

E. *Control of biological, chemical, and radiological weapons* is a field whose importance remains rather difficult to assess, despite some recent studies by competent authorities.[27, 28] Although there is little doubt that many nations are carrying on serious efforts in this field, the impression still prevails that such weapons represent more of a potential for nuisance than for decisive influence in possible major conflicts.* Still, the usefulness of such weapons may be much greater when viewed with the eyes of a small nation, because of their relative cheapness and the universality of their availability, and they might be capable of playing a decisive role in a relatively localized conflict.

A number of aspects of those weapons suggest possible special control methods. Thus, while the research and development stage would require minimal facilities normally available as a result of legitimate biological, chemical, and nuclear-power activities, their field testing and deployment for use might require special preparations and concurrent activities—such as the large-scale immunization of populations in the case of biological agents affecting man—which could be readily detectible by an inspection system.

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* "As means of immediate and certain destruction, these weapons cannot compare with hydrogen bombs. The dependence of biological weapons on uncontrollable factors, such as meteorological conditions, and the difficulty of confining the effects to the attacked territory, make them especially unpredictable in scope and effect. . . . But, however difficult the international control of atomic weapons may be, the international control of biological and chemical weapons by any system of inspection seems incomparably more difficult" (from the Statement of the Pugwash International Conference of Scientists on Biological and Chemical Warfare[28]).

Conclusions

Any survey of the techniques available for the implementation of possible arms-control systems is bound to conclude with remarks concerning the woeful inadequacy of past and present research in this field. The painfully obvious need for an organized governmental effort, also capable of developing a governmental group with a "vested interest" in arms control comparable with that normally devoted to the enhancement of military capabilities, has been forcefully pointed out on many occasions.[29] With such remarks I concur. Beyond this, I would like to call attention to two specific problems in which it appears that further research is most urgently needed. Their solutions, if such are possible, lie at the very heart of the questions of the feasibility and possible extent of comprehensive arms-limitations measures. These are:

A. *The stockpile problem,* or the question of the degree of certainty with which it may be possible to ascertain (by a study of past records, inventories, plant characteristics, etc.) the amount of weapons material which may have been sequestered by a nation, or by an influential group within the nation, before the institution of a control agreement. There is a considerable overlap between the methods of attacking this problem and those developed for the prevention of clandestine diversion of new weapons materials; but almost all discussions found in the open literature refer to the latter.

Of course, the stockpile problem applies to all weapons on which there might be some agreed limitation; however, this discussion will be limited to nuclear weapons and long-range missiles. Given free access to all plants capable of producing appreciable fissionable material, and to all of their records, the problem of ascertaining past production has many approaches which taken together can help to narrow the uncertainty of the estimate. Thus, the records of past power production (or heat removal), together with a knowledge of plant design characteristics, provide an estimate of production of plutonium or uranium 233. Records of mining operations and of uranium ore-processing activities yield information on the raw materials which have gone through the plants, including plants for the separation of uranium 235. Waste products, through their chemical and radiochemical analysis, yield information on past production.

The uncertainty in the estimate of past production increases with the total amount of material processed and with the length of time over which there has been an uninspected production. As of this writing, the stockpile problem applies only to the three or four nuclear powers. With the exception of the Melman study,[10] the existing information is mainly classified. The numbers which one occasionally hears quoted by apparently reliable sources for the amount of fissionable material which could be sequestered from present stockpiles in the USSR, if an agreement were to take effect now, with little chance for subsequent detection that a diversion had been effected, range from enough to produce about fifty large thermonuclear bombs up to enough for about five hundred. Clearly, it is important to develop techniques for reducing the actual upper limit of uncertainty. It would be important for the purpose of public discussion and planning for the presently accepted upper limit to be made public.

The stockpile problem with respect to ICBM's has been discussed in considerable detail in the Melman report.[10] On the one hand, the problem is less difficult because of the relatively short time during which it has been possible to accumulate hidden stockpiles and because of the size of the objects. On the other hand, missiles require many components, some of a rather specialized nature, whose production is wide-spread throughout the normal industrial activities of an industrialized country; this aspect tends to increase the difficulty of detecting any one clandestine activity, but it provides for a large number of possible points of detection.

After the production of fissionable materials and the manufacture of missile components, these must be assembled into weapons, deployed and maintained in readiness if they are to be used by a potential aggressor. While such activities might also be rooted out by physical inspection techniques, it may be precisely in this field that nonphysical techniques (psychological inspection, inspection by the people, etc.) will have their most fruitful application.

In any event, the possible size of clandestine stockpiles is likely to be among the crucial factors which will set the level of possible disarmament agreements at any time.

B. *Research and development constraints* are implicitly assumed in most control systems envisaged, since practically all such systems are unstable with respect to a technical breakthrough capable of providing a decisive military advantage to one member of the agreement. This instability applies in schemes of armed deterrence perhaps even more than in situations of relatively comprehensive disarmament. Although the inspection techniques discussed above may all be relevant to some forms of research and development activities, this inspection problem is one which by definition defies general solution; for how does one predict the unknown? Nevertheless, some techniques have greater relevance than others, e.g., methods of records inspection. In particular, the nonphysical techniques would appear to offer the greatest promise, especially in those aspects which provide for a continuing census of the activities of key specialists.

Any serious attempt at inspecting research and development activities implies the complete elimination of secrecy from research. This openness would have to apply not only to basic research, but to governmental and industrial research activities as well. In the final analysis, however, stability with respect to technological progress could probably only be achieved through the adoption and exercise of stringent self-restraints on the part of sovereign nations; the solution of this problem may, in fact, demand the greatest self-restraint of all—the eventual relinquishment of absolute national sovereignty in favor of an international order with the enforcement capabilities necessary to establish and preserve the peace.

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Adjudication and Enforcement in Arms Control

THE PURPOSE OF THIS ESSAY is to examine the problems of adjudication and enforcement in the context of a limited agreement on arms control. Its premise is, therefore, that one or more agreements will be concluded, providing for various measures of disarmament and for their effective supervision and control, but not for a complete system of world law.

Among friends, a pledged word is sufficient and there is no need for the establishment of a complicated machinery for the adjudication of disputes or the enforcement of decisions. But, in a situation where mutual trust does not exist, where suspicions are rife, and many disagreements are likely to arise, adequate methods must be provided in advance for the settlement of disputes and for ensuring compliance with both the basic rules and the decisions rendered to implement them.

The record of past relations between the nations of the Atlantic community and the Soviet bloc shows the importance of inserting in an agreement as many precise provisions as possible, leaving little to future determination. It is evident that even the relatively simple problem of the suspension of nuclear tests will require a long and detailed treaty. A comprehensive agreement on arms control is likely to be at least as detailed as recent agreements in the economic area, such as the treaty establishing the European Economic Community, which is some 150 pages long.[1] It is not possible, however, to foresee all the probable difficulties, and means must be found to deal with them in an adequate manner.

It would destroy the effectiveness of a treaty on arms control if any party to it were permitted to decide on the scope of its obligations. While each party to the treaty would like to limit its obligations to a minimum, it desires at the same time to impose as strong obligations as possible on the other parties. Treaty provisions are usually reciprocal, and impose equal obligations on all parties. In order to achieve the desired measure of control over other parties, each party must accept some limitations on its own freedom of decision. The ordinary way of achieving such control is to entrust to a third party the power to interpret the treaty in case of a disagreement between the parties.

Alternative Methods for Settling Disputes

There are many methods of settling such disagreements. Sometimes the parties can agree only to submit the dispute to a commission of investigation for a clarification of facts by means of an impartial enquiry. Quite often they also empower a commission to engage in conciliation and to present to the parties not only its conclusions about the facts but also its recommendations for a friendly settlement of the controversy. To ensure themselves further against the danger of an unwelcome decision, some countries have insisted that such commissions be composed of an equal number of persons from the two countries involved in the dispute. Such a joint commission is able to impose a decision, or even to make a recommendation, adverse to one of the parties only if at least one of that party's representatives agrees to it. Surprisingly, that method has proved quite successful in the settlement of disputes between the United States and Canada, where, through patient exploration, in many cases equitable solutions have been developed which both parties found it possible to accept.[2]

Nevertheless, this method is not a reliable one, especially if the relations between the parties are full of suspicions. In most instances, a more adequate method of settlement is needed, one which would lead to a binding decision. Three institutions are available for that purpose: an arbitral tribunal, the International Court of Justice, or a specialized court.

The oldest method is to create an arbitral tribunal for each dispute (or group of disputes) after the dispute has arisen. In such a case, a tribunal can be specially tailored to the requirements of a particular dispute; its members may be experts on the subject in dispute, and their nationalities may reflect the wishes of the parties with respect to an appropriate balance between representatives of the parties and neutral members.[3] It is possible, of course, to sabotage an arbitration by refusing to nominate the arbitrators, but methods can be devised to take care of this difficulty. Model rules on arbitral procedure were prepared in 1958 by the International Law Commission, and when properly followed they can ensure effective arbitration.[4] While an arbitral tribunal can solve satisfactorily a particular controversy, its period of existence is relatively short and it cannot develop a system of constant jurisprudence which could serve as a guide for the future conduct of the parties. A more permanent tribunal is necessary for that purpose.

The International Court of Justice at The Hague is the principal judicial organ of the United Nations. It is composed of fifteen judges, no two of whom may be nationals of the same state. Five of them are nationals of the permanent members of the Security Council, though this is not guaranteed in the statute of the Court; four judges come from Latin America, two from Western Europe, one from Eastern Europe, two from Commonwealth countries, and one from the Arab group of nations. Only two members of the Court come from Communist countries, and only one from a neutralist nation (the United Arab Republic).[5]

It can easily be seen that the Soviet Union would be reluctant to submit to the jurisdiction of the International Court of Justice in view of its predominantly Western composition. On the other hand, the Western nations might be reluctant to change the composition of the Court for all cases in order to obtain the agreement of the Soviet Union to submit to the jurisdiction of the Court in cases arising out of the arms-control agreement. If it should prove possible, however, to increase the number of judges from the neutral countries to at least three, the parties to the arms-control treaty might ask the Court to establish a special chamber for disputes relating to arms control. Such a chamber might be composed of two judges coming from the Atlantic community, two Communist judges, and three neutral judges. Such a special chamber of the Court could develop a consistent system of interpretation of the arms-control agreement, and would have behind it the prestige of the Court. A procedure might even be developed by means of which the arms-control chamber could obtain the advice of the full Court on questions of general international law which might be involved in a particular case, thus ensuring that the chamber would not depart too far from the general trend of the decisions of the Court.

It might be argued, however, that the problems of arms control require special technical knowledge and that many questions which would arise might require a method of approach more characteristic of constitutional and administrative law than of international law.

Consequently, it might be preferable to establish a separate tribunal, composed of persons especially qualified to deal with matters of this type. It might also be easier to reach an agreement on the composition of such a tribunal than to make the choice of the judges of a chamber from the limited membership of the International Court of Justice. While the United Nations or the proposed International Disarmament Organization (I.D.O.) cannot be a party to contentious proceedings before the International Court of Justice, and can only take part in proceedings relating to advisory opinions, an agreement creating a separate court may open such a court to these international organizations on a basis of equality with states. Finally, it might be possible to open the special tribunal to private parties (individuals and corporations) which claim to have suffered an injury because of the activities of the International Disarmament Organization. The International Court of Justice cannot be opened to them except through an amendment to the statute of the Court which might be difficult to push through in view of the tradition that this Court should be reserved for interstate disputes.

Such a special court might be modeled on the Court of Justice of the European Coal and Steel Community, the jurisdiction of which was extended in 1958 to the other European communities, the European Economic Community and the European Atomic Energy Community (Euratom).[6] It may be noted that the Euratom Treaty contains both provisions concerning safety control against diversion of fissionable materials and provisions empowering the Court of Justice to deal with violations of the Treaty.[7] Similarly, the Convention on the Establishment of a Security Control in the Field of Nuclear Energy, signed in Paris on 20 December 1957, established a special tribunal to supervise the activities of the European Nuclear Energy Agency of the Organization for European Economic Cooperation.[8]

Additional difficulties might be created by the fact that certain inspection activities might require approval by an international court; in other cases, judicial action on the spot might be needed, rather than a decision at the seat of the court which might be quite distant from the place where emergency action is required. It might be suggested, therefore, that one court would not be sufficient and that a system of international courts needs to be created. The alternative would be to delegate these local functions to national courts, and to provide only for a right of appeal to an international court. Unfortunately, there is little inclination on either side to trust the judicial system of the other, and only a true international solution would be acceptable to all concerned.

If the idea of a system of special courts is accepted, it will not be necessary to create a large number of these courts. There might be one court for North America, one for Western Europe, one for the Soviet Union and Eastern Europe, one for China, one for Southeast Asia and the Far East, one for the Arab countries and North Africa, one for the rest of Africa, and one for Latin America—altogether, eight lower courts, each composed of three judges none of whom would be a native of the region. In addition, an appellate tribunal would be established which would also have primary jurisdiction over more important disputes between the states that are parties to the arms-control agreement and over disputes between states and the International Disarmament Organization. The appellate tribunal might be composed of nine judges (three Western, three Communist, and three neutral).

The advantages of the prestige and judicial impartiality of the International Court of Justice and of the easier accessibility and specialized knowledge of the special disarmament courts might be combined in a system which would combine lower tribunals with a right of appeal to the International Court of Justice. Such a system might be preferable to one equipped with a separate appellate tribunal, which would require a long time before it developed a reputation for impartiality and freedom from political influences equal to that of the International Court of Justice. It might be noted that such a system of appeals was developed after World War I, when disputes arose about the validity of the decisions of various mixed arbitral tribunals established to deal with disputes between Hungary and her neighbors. Several appeals were actually brought to the Permanent Court of International Justice in accordance with an agreement of 28 April 1930,[9] and the Court developed an effective procedure for dealing with them. In particular, no difficulties were caused by the fact that the judgments of the tribunals were rendered in disputes between individuals and a state, while the appeals were brought by one state against another; the Court found it quite proper that two states might submit to it a dispute about the correctness of a judgment of another tribunal rendered in a case involving directly only one of these states.[10]

An appellate procedure established for disputes under an arms-control treaty need not be available in every case; it might be limited to cases in which at least two judges of the International Court of Justice have made a preliminary finding that the lower tribunal, from which an appeal is being made, appears (a) to have decided wrongly a question of the interpretation of the arms-control treaty; (b) to have exceeded its jurisdiction; (c) to have departed from the previous jurisprudence of the International Court of Justice; or (d) to have committed a serious procedural error resulting in a denial of justice.

Subjects of Adjudication

Whatever the tribunal selected to deal with disarmament disputes, it might be necessary to state in more precise terms what its jurisdiction should be, i.e., what the range of matters which could be submitted to it should be. There would seem to be six main categories of cases: (a) disputes between two or more states with respect to the interpretation or application of the arms-control agreement; (b) disputes between the International Disarmament Organization and a state about the state's nonperformance of its obligations under the arms-control agreement; (c) requests by the International Disarmament Organization for judicial authorization to take certain inspection or enforcement steps against states; (d) appeals by a state against decisions of the International Disarmament Organization, asking for annulment on the grounds of lack of competence, major violations of procedure, violation of the arms-control treaty, or abuse of power; (e) appeals by private persons against decisions of the International Disarmament Organization enforcing the arms-control treaty against them, and complaints against acts of officials of the Organization who allegedly caused an injury to a private person. The cases in the fifth category and some of the cases in the third would be within the jurisdiction of the lower courts, subject to appeal to the appellate court; other cases would be within the original jurisdiction of the appellate court. In many respects, the jurisdiction of these courts would be similar to that of the Court of Justice of the European communities.[11] As in those communities, the purpose of the proposed arrangements will be to ensure the rule of law in the interpretation and application of the disarmament treaty.

It may be expected that direct disputes between states about the interpretation of the disarmament treaty are not going to be frequent. It is more likely that such disputes will ordinarily arise between the International Disarmament Organization and a state, though it is possible that the action of the Organization against a particular state might in some cases be the result, not of a report by its own inspectors, but of information supplied by another state. The first steps will be taken usually through the administrative process. For instance, if the management of a nuclear power plant should obstruct an inspection of the plant, the International Disarmament Organization would first ask the state in which the plant is situated to arrange for the admission of the inspectors. If the state should refuse to make such an arrangement, it might base its refusal on legal grounds; it might contend, for instance, that the plant in question is not subject to inspection under the treaty, or that the permitted annual number of inspections has been exhausted, or that the inspectors did not proceed through proper channels in seeking an admission to the plant. In another case, the International Disarmament Organization might request that a para-military unit be disbanded, while the state concerned might contend that the unit in question was not military but a training camp for athletes. Should the International Disarmament Organization consider these contentions unjustified, and should it prove impossible to settle the matter by negotiations, the Organization might bring the matter to the competent disarmament tribunal for a final decision.

Safeguards against Abuses by Inspectors

The provisions of the disarmament treaty relating to inspection might also include various guarantees against a possible abuse of power by the International Disarmament Organization. For instance, it might be provided that inspections outside a specified quota would be permitted only if the Organization had obtained a special authorization from the disarmament tribunal. Such an authorization would be issued by the tribunal only upon the showing of reasonable cause to believe or suspect that a prohibited or unlicensed activity was being conducted in a certain area. If there should be provisions empowering the International Disarmament Organization to grant, suspend, and revoke licenses to produce small arms, to engage in certain kinds of research, or to utilize nuclear materials, appeals to international tribunals might be granted against a refusal to grant a license or an allegedly unjustified suspension or revocation of a license.

It might be expected that the disarmament treaty would require that international inspectors should have due regard for all rights of personal privacy and private property, and should take into consideration the laws and customs of the respective nations to the fullest extent consistent with the effective discharge of their duties. In particular, safeguards would be necessary to prevent the disclosure of industrial secrets discovered during an inspection, except, of course, in a case in which such disclosure was necessary in order to accomplish the purposes of the arms-control treaty. In all these situations, recourse to an international tribunal might be necessary if an inspector violated his obligations under the treaty; in proper cases, just compensation would be granted to the injured state or person.

If the International Disarmament Organization should abuse its power to classify certain materials as "war materials" or as "nuclear materials," and should order their destruction or subject them to international controls, the state concerned, or even a private person owning such materials, might appeal to the disarmament tribunal against the decision of the Organization. There might also be cases in which a state would consider that the International Disarmament Organization should take certain action required by the treaty; e.g., if the Organization has neglected to inspect the territory of some states for a long period of time, another state might ask the tribunal to order the Organization to conduct such an inspection. Complaints might also be brought against the Organization if it should discriminate against some states and submit them to stricter controls without any special justification.

Finally, a state or a private person might have recourse to an international tribunal even before action has been taken by the International Disarmament Organization or one of its inspectors, if the contemplated action is considered as exceeding the powers of the Organization. In such a case the tribunal might issue an injunction prohibiting the taking of such action until the matter is decided by the tribunal.

Injunctions might also be issued by an international tribunal in the reverse situation, when an activity of a state or of a private person is alleged by the International Disarmament Organization or by another state to be contrary to an international obligation. Under its statute, the International Court of Justice is entitled to indicate provisional measures, and it has developed the necessary arrangements to treat requests for the indication of interim measures of protection as a matter of urgency.

Revision of Treaty Provisions

As stated above, it may be anticipated that the disarmament treaty would contain not only some general principles but also a large number of detailed provisions. While the institution of an impartial tribunal would provide a method for removing at least some of the difficulties caused in the past by divergent interpretations of agreements between the West and the Soviet Union, it would still seem wise to try to solve most of the ambiguities in the treaty itself.

This method, however, has its own limitations. Circumstances change, unforeseen scientific or technical developments make certain provisions of the disarmament treaty obsolete, and there might be sudden shifts in the careful system of checks and balances established by the treaty. The negotiations on the suspension of nuclear tests have shown the impact of new discoveries which invalidate the premises of the first agreement on the subject. Similar problems may arise in the future, and methods must be found for dealing with them in an effective manner; otherwise the whole system might fall apart.

It might be noted that the treaty establishing the European Coal and Steel Community provides a procedure for dealing with special situations in which an amendment would be required in the rules for the exercise by the High Authority, the administrative organ of the Community, of the powers conferred upon it by the treaty. In particular, such amendments might be needed because of unforeseen difficulties experienced in executing the treaty or because of a profound change in the economic or technical conditions directly affecting the common market for coal and steel. The necessary amendments may be proposed jointly by the High Authority and the Council of Ministers of the Community, acting by a five-sixths majority. They are then submitted to the Court of Justice of the Community for an opinion on the question of whether or not the conditions prescribed in the treaty have been in fact fulfilled, and whether the proposed amendments are compatible with the articles of the treaty stating the basic purposes of the Community and whether those amendments do not change the relation between the various institutions of the Community. If the Court finds that the amendments conform to these requirements, they are submitted to the Common Assembly of the Community for approval. Should the Assembly approve them by a majority of three-quarters of the votes cast, representing a two-thirds majority of the total membership, the amendments come into force without need for further action by member states.[12]

A similar procedure might be devised for the arms-control treaty. It has been proposed by L. C. Bohn and others that amendments for taking into account changes in the technology of weapons and in detection devices should be adopted by a simplified procedure. Thus, the disarmament treaty might provide for the submission of amendments proposed by the executive organ of the International Disarmament Organization, and approved by its supervisory organ, to the international tribunal empowered to interpret the treaty. The tribunal would render an opinion about the compatibility of the amendments with the basic objects of the treaty and with the division of powers among the various institutions of the Organization. In case of a favorable opinion on the part of the tribunal, the amendments would be submitted to the Assembly of the Organization (or the General Assembly of the United Nations). If approved by that body by a two-thirds majority, including a majority of the principal powers, the amendments would come into force without further reference to member states for ratification. However, should the amendments introduce major changes in the disarmament treaty, the ordinary procedure of amendment would have to be followed, i.e., ratification in accordance with their respective constitutional processes by a prescribed large number of members, including almost all the principal powers.

One might have to deal also with a situation in which an amendment, found to be necessary by the executive organ of the International Disarmament Organization and to be compatible with the disarmament treaty by the international tribunal, has nevertheless failed to obtain the required majority in the Assembly or the necessary number of ratifications. In such a case, those states which consider that the nonadoption of the amendment would prejudice the further execution of some of the provisions of the disarmament treaty might request the tribunal to make a finding releasing them from those treaty obligations which can no longer be inspected in a satisfactory manner. The tribunal may make such a release conditional on a second submission of the amendment to the Assembly and its final rejection.

Enforcement

The enforcement of the arms-control treaty must be based on the principle that sanctions should be proportioned to the violations. There should be a number of sanctions available to the international authorities, and, to the extent that circumstances permit, there should be a slow progression from minor to major sanctions.

It might be important to avoid as far as possible the implication that each violation is one for which the government of a country must be directly responsible. In many cases it might be possible to take action against an individual or company engaged in a prohibited activity. In such cases, the main burden of enforcement should be put on the state in the territory of which such a prohibited activity has taken place. The International Disarmament Organization might request that state to stop the activity and to punish the persons concerned. Only if no steps are taken by the state, or if the steps taken are inadequate, would further action by the International Disarmament Organization be required. If a question of interpretation of the arms-control treaty should be involved in the case, and a state court should find the person not guilty of any violation or should order insufficient punishment, an appeal from the state court to the international tribunal could be taken by the International Disarmament Organization. Final judgments of the international tribunal in such cases of appeal should be entitled to forced execution in the territory of the state concerned to the same extent as local decisions. If the international tribunal has imposed a fine, such a fine may also be collected from any property which the person fined owns in some other country.

In another group of cases, the International Disarmament Organization might consider that a particular violation of the disarmament treaty is due only to negligence, error, or an improper action of subordinate officials, and that it does not constitute a deliberate act of the government of the state concerned. In such a case, it might again be sufficient to call on that government to take such action as is necessary to remedy the violation. If, however, the violation is not remedied within a specified period, further action would be necessary.

The most difficult problem of enforcement arises in situations in which a state itself has committed a major violation, or in which there is a dangerous pattern of minor violations or of unremedied violations by private persons. If there should be a dispute as to facts, or if the state concerned should contend that the facts in question do not constitute a violation of the arms-control treaty as interpreted by that state, the matter would be submitted by the International Disarmament Organization to the disarmament tribunal for decision. Should the tribunal find that a violation has occurred and should the state refuse to take any remedial action ordered by the tribunal, two types of sanctions would be available.

In the first place, economic sanctions might be taken against the state concerned: economic assistance might be canceled, payments on international loans might be stopped, international trade relations might be severed, and the foreign assets of the state and of its citizens might be frozen. If the state is relatively small and is not supported by a large bloc of other states, strict economic sanctions should be sufficient to ensure compliance. In view of the economic interdependence of most states, even relatively large states would have to comply, especially if the two superpowers should support these sanctions, or at least do not interfere with them. The "cold war," however, has shown the limited efficacy of economic sanctions against a superpower, and, in case of a violation by a superpower or by a nation strongly supported by such a power, economic sanctions might prove of no avail.

In such a case, it might be necessary to resort to the other alternative—the cancellation of the disarmament treaty, or at least a threat of such cancellation. It may be expected that a treaty on arms limitation would come into effect only if it is so well balanced that all the parties to it will have a vested interest in its enforcement and permanency. Should a state be faced with the possibility that the disarmament treaty would cease to be binding on all other states if it should continue to violate the treaty, it would certainly have to weigh carefully the danger of a new arms race and the fact that it alone would be held to blame. In most cases, these considerations should be sufficient for it to accept the decisions of the International Disarmament Organization and the disarmament tribunal. If the violator should refuse to mend his ways, it would be necessary for other states to follow up the threat and to start rearming, at least to the extent necessary to even up the balance disturbed by the first state's violations.

It would be dangerous to leave this important decision about the withdrawal of the other states from all or some provisions of the arms-control treaty to the sole judgment of those states. The circumstances in which such a withdrawal would be permitted should be defined in the arms-control treaty itself, and the states relying on the relevant provision of the treaty would have to prove before the international tribunal that these circumstances have actually occurred. Only if the tribunal should agree with the contentions of these states, would they be entitled to withdraw and the disarmament treaty canceled in whole or in part. In an emergency situation, the tribunal would, of course, allow the states concerned to take such preliminary steps as might be needed to keep up with the state which has committed the violations forming the basis for the cancellation proceedings. Thus, the security of states would not be endangered by the delay caused by judicial proceedings.

This brief survey shows the role which might be played by international tribunals in the enforcement of an agreement on arms control. Such tribunals can solve disputes between the parties to that agreement and ensure that the rule of law is observed in the day-today interpretation and application of the agreement. Even in case of a serious disruption of the disarmament process, the tribunals can help to make certain that the treaty will not be terminated on a flimsy pretext. The different procedures outlined above would have to be worked out in finer detail, and many theoretical and practical difficulties would probably be encountered. But the task is not impossible, and with diligence and perseverance the required solutions can be discovered.

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2 See, e.g., Louis M. Bloomfield, *Boundary Waters Problems of Canada and the United States: The International Joint Commission, 1912-1958.* Toronto: Carswell, 1958.

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T. C. SCHELLING

Reciprocal Measures for Arms Stabilization

THERE HAS BEEN a widespread change in the thinking on arms control in the last year or so. Much of it is due to the focus of attention on "measures to safeguard against surprise attack" (to use the official terminology). Although this subject is still listed anachronistically under "disarmament," it is differently oriented. It assumes deterrence as the keystone of our security policy, and tries to improve it. It accepts a retaliatory capability as something to be enhanced, not degraded—something to be made more secure, less accident-prone, less in need of striking quickly to avoid its own destruction, less capable of gaining advantage from a sudden attack of its own. An anomaly of this approach to arms control is that it does not necessarily involve "disarmament" in the literal sense.

Another anomaly, which rather shakes the disarmament tradition, is that weapons may be more stabilizing and less aggressive if they are capable of civilian reprisal rather than of military engagement. A standoff between two retaliatory forces is in some ways equivalent to an exchange of hostages; and "inhumane" weapons, capable of inflicting damage but not able to go after the enemy's strategic forces, acquire virtue because of their clearly deterrent function and the lack of temptation they give either side to strike first.

More important, though, is the fact that schemes to avert surprise attack are manifestly compatible with a national military policy, not a renunciation of it. They emphasize the possibility that one can simultaneously think seriously and sympathetically about our military posture and about collaborating with our enemies to improve it. To propose, as does the notion of "measures to safeguard against surprise attack," that military cooperation with potential enemies may offer opportunities to improve our military posture, opens a new field for imaginative scientific and military thinking, and may eventually enlist the support of the military services themselves.

Most of this progress is still ahead of us; the revolution in thinking about arms control is barely started. Officially we have taken only the most hesitant steps in defining arms control in a way that does not contradict our national security policies. We still talk officially as though "disarmament" can only save money, without noticing that under the new philosophy it could cost more. We still work officially with an image of disarmament that makes it solely a peacetime (cold-wartime) process of negotiating explicit detailed agreements in a multinational context for the reduction or elimination of weapons, without adequately recognizing that, as in limiting war, limiting the arms race can be a more tacit and less formal process than the "treaty" idea implies. More important, the prevalent image of disarmament is still one that gives the process a uniquely defined end point—the point of no arms at all, or virtually none except in the hands of some international authority or synthetic state that would have the power to police the world against international violence but against nothing else.

The cautious and the skeptical, the pessimists and the realists, have doubts about how rapidly that end point can be approached, whether it will be approached at all, and whether the process once started may not be reversed. But the ultimate goal is rarely challenged except by those who have no interest in arms control. And by far the most frequent argument raised in favor of particular limited measures of arms control, perhaps the most widely persuasive, is that these limited measures are at least "steps toward" the goal of ultimate disarmament. We have not faced up to the implications of the anomaly that "measures to safeguard against surprise attack" are designed to preserve a nuclear striking power, and are not easily construed as just another "step toward" ultimate disarmament.*

We still talk about "levels" of armament or disarmament, as though there were only two directions in which to go, up and down, the arms race going in one direction and arms control in the other. We have not yet admitted that, even in the framework of arms control, it could be an open question whether we ought to be negotiating with our enemies for more arms, less arms, different kinds of arms, or arrangements superimposed on existing armaments. We have given little thought even to the weapon system that would be required by that ultimate international authority that might police the world against armed violence, and to whether it, too, would be embarrassed by a "massive retaliation" doctrine that would lack credibility; whether it, too, might be subject to surprise attack; whether it, too, would lack resolution (as some think NATO might lack resolution) to reach an awful collective decision in response to nibbling agression or bland violation.

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* See T. C. Schelling, "Surprise Attack and Disarmament," in Klaus Knorr (ed.), *NATO and American Security* (Princeton: Princeton University Press, 1959), or the shorter version in T.C. Schelling, *The Strategy of Conflict* (Cambridge, Harvard University Press, 1960), ch. 10.

The point of this paper is that there is a vast new area to be explored once we break out of the traditional confinement of "disarmament"—the entire area of military collaboration with potential enemies to reduce the likelihood of war or to reduce its scope and violence. It is an area worth exploring because our present military policies and prospects, however we feel about the adequacy of current programs, cannot promise security from a major thermonuclear war; and even modest improvements achieved through cooperation with the Soviets should be welcome.

It is not true that in the modern world a gain for the Russians is necessarily a loss for us, and vice versa. We can both suffer losses, and this fact provides scope for cooperation. We both have—unless the Russians have already determined to launch an attack and are preparing for it—a common interest in reducing the advantage of striking first, simply because that very advantage, even if common to both sides, increases the likelihood of war. If at the expense of some capability for launching surprise attack one can deny that capability to the other, it may be a good bargain. We both have a common interest in avoiding the kind of false alarm, panic, misunderstanding, or loss of control, that may lead to an unpremeditated war, in a situation aggravated by the recognition on both sides that it is better to go first than to go second. We have a common interest in not getting drawn or provoked or panicked into war by the actions of a third party (whether that party intends the result or not). And we may have an interest in saving some money by not doing on both sides the things that, if we both do them, tend to cancel out.

This common interest does not depend on trust and good faith. In fact it seems likely that unless thoroughgoing distrust can be acknowledged on both sides, it may be hard to reach any real understanding on the subject. The intellectual clarity required to recognize the nature of the common interest may be incompatible with the pretense that we trust each other, or that there is any sequence of activities in the short run by which either side could demonstrate its good faith to the other.

Ancient despotisms may have understood better than we do how to tranquilize relations between them while hating and distrusting. They exchanged hostages, drank wine from the same glass, met in public to inhibit the massacre of one by the other, and even deliberately exchanged spies to facilitate transmittal of authentic information. And perhaps, having exchanged a son for a daughter in the cold-blooded interest of contract enforcement, they may have reduced tension sufficiently to permit a little affection to grow up in later generations.

Arms Control and Military Technology

The premise underlying my point of view is that a main determinant of the likelihood of war is the nature of present military technology. We and the Russians are trapped by our military technology. Weapon developments of the last fifteen years, especially of the last seven or eight, have themselves been responsible for the most alarming aspects of the present strategic situation. They have enhanced the advantage, in the event war should come, of being the one to start it. They have inhumanly compressed the time available to make the most terrible decisions. They have almost eliminated any belief that a really big war either could be or should be limited in scope or brought to a close by any process other than the sheer exhaustion of weapons. They have greatly reduced the confidence of either side that it can predict the weapons its enemy has or will have in the future. In these and other ways the evolution of military technology has exacerbated whatever propensities toward war are inherent in the political conflict between us and our enemies. It might be naïve to say that this is an unmixed evil for both us and the Soviets, since it powerfully affects the bilateral contest between us; nevertheless, it is hard to escape the judgment that nature might have been kinder in the way she let our military technology unfold itself over the last decade and a half.

It is interesting—more than that, it is useful—to ask what technological achievements (available both to us and to our enemies) we wish had never occurred, and what technological failures we wish had turned out otherwise. Do we wish the hydrogen bomb had never come along to make intercontinental missiles economical? Do we wish that nuclear-powered aircraft had made airborne alert so cheap that retaliatory aircraft could stay aloft rather than be vulnerable on the ground to a missile attack? Do we hope that no one ever discovers an economical means of nullifying ballistic-missile submarines, so that neither side can hope to preclude retaliation by sudden attack? Do we wish that warning systems were so nearly perfect that "false alarm" were virtually impossible, or so poor that we could never be tempted to rely on them? Do we wish that missiles had never become so accurate that they could be used to destroy an enemy's missiles in an effort to negate an enemy's retaliatory threat? Do we wish that radioactive fallout could not occur, or do we welcome it as a peculiarly retaliatory (and hence deterrent) weapon effect that is of little use in a pre-emptive attack? Do we wish that secrecy about weapons and weapon production were much more difficult to maintain than it is, or welcome certain kinds of secrecy as a form of mutually appreciated security against surprise attack?

The reason why it is productive to speculate on these questions, rather than merely fanciful, is that arms control can usefully be thought of as a way of changing some of the answers. In addition to what we can do unilaterally to improve our warning, to maintain close control over our forces, to make our forces more secure against attack, to avoid the need for precipitate decisions, and to avoid accidents or the mistaken decisions that they might cause, there may be opportunities to exchange facilities or understandings with our enemies, or to design and deploy our forces differently by agreement with our enemies who do likewise, in a way that enhances those aspects of technology we like and that helps to nullify those that we do not.

If we wish that radar were better and cheaper and less limited by the Earth's curvature, we might make it so by exchanging real estate with the Russians for the construction by each of us of observation posts on each other's soil. If we hope that no one can ever predict with confidence how his own missiles would do, in a surprise attack, against the hardened missile sites of his opponent, we might deny each other the necessary knowledge by banning tests of large weapons in the era in which anyone actually has a missile in a hard underground site that he could use in a weapon-effects test. If instead we wish that each side might preserve the privacy of its railroad lines for mobile missiles, we might jointly eschew certain surveillance techniques; and if we thought that anti-missile defenses of missile sites might be more feasible, and retaliatory forces correspondingly less vulnerable, with the further testing of nuclear weapons and their effects, we might look with more favor on continued weapon testing. These considerations are by no means the whole story in arms control, but they do remind us that we and our enemies can both jointly welcome, or jointly deplore, certain technological developments (like the improved accuracy of long-range missiles) and may possibly find ways, jointly, to enhance them or to offset them, over and above the things that we can do unilaterally.

Need for Strategic Analysis

These examples suggest some of the criteria that can be applied to limited arms-control schemes, and some of the difficulties in implementing them. As to criteria, the first thing to emphasize is that it takes a good deal of strategic analysis to decide whether a particular limitation or augmentation of weapons or facilities is a good one or a bad one. Viewing limited measures on their individual merits, and not as steps in a comprehensive program that can be justified only by a long sequence of steps to follow, one has to ask whether the technological and economic consequences of a particular scheme are or are not conducive to military stability; and the answer is very unlikely to be closely correlated with whether more weapons or fewer weapons are involved, bigger weapons or smaller ones, or even whether notions of "more" and "less," "bigger" and "smaller," can be applied. Whether we would like to see reconnaissance satellites banned or encouraged may depend, for example, on whether we think they will mainly provide targeting information to the initiator of war or mainly provide warning to a potential defender so that a potential attacker is the more deterred. Whether we like big missiles or not may depend on whether we believe, as so many believed a few years ago, that missiles would be simple and sturdy and hard to destroy in their underground sites or believe as so many fear now that increased accuracies and yields make the present generation of missiles better for a first strike than for a second strike. Whether we wish missile technology to be advanced or retarded may depend on whether or not we believe, as many do, that the next generation of missiles will be easier to protect, easier to hide, or easier to keep moving, and therefore less insecure. Whether one welcomes nuclear-powered ballistic-missile submarines on both sides or deplores them depends on whether they seem to be peculiarly good at surviving and retaliating, and hence "deterrent," or peculiarly good at getting up close for a no-warning strike on an enemy's retaliatory power. And if it were somehow possible to enforce a ban on "dirty" bombs, there would still be a genuine strategic question of whether or not we wish deterrent capabilities to be enhanced by the greater punitive power of dirty bombs, recognizing that comparatively slow-acting fallout may be of much less utility to a potential attacker, whose main interest is to minimize retaliation on himself.

Implications for Arms Agreement

The fact that developments such as these require strategic analysis before it can be decided whether they are good or bad is, aside from being true, discouraging. It means that even among the experts there will be disagreement about the consequences of any particular prohibition or exchange of military facilities; it may be next to impossible to get widespread understanding of the relevant arguments, even within governments. And if fairly detailed analysis is required, and careful distinctions have to be made, prohibitions might have to be specified in equally careful detail and with equally fine distinctions. This is certainly an obstacle to negotiation. Furthermore, any analysis—and any prohibition or agreement or exchange of facilities that is justified on the basis of such analysis—is subject to rapid obsolescence. The friendly warning satellite appears, a year later, as a vicious targeting aid to the surprise attacker; the network of warning systems originally designed for mutual reassurance proves in operation to have too high a false-alarm rate; the missile-guidance systems that we deplored because of their extreme accuracy and the advantage they would give the attacker may prove, after we outlaw them, to have been the main hope for mobile missile systems desired for their invulnerability and hence for their stability. By the time we reach agreement on precisely what to allow in our satellites, where to place our radar, or what missiles to ban, new evidence or new analysis comes along to suggest that the justification of the particular scheme we are about to subscribe to is all wrong.

Finally, by the time we look at individual schemes in sufficient detail to judge whether their strategic implications are "good" for both us and our enemies, we may have narrowed them down to the point where they are intolerably biased. It is probably a mathematically sound principle that the more measures we put in a package, the more their bilateral biases will cancel out, and hence the greater will be the joint gain relative to the competitive advantage. This may mean that once a potential arms-control system is dissected into sufficiently small pieces to apply the right kind of analysis, we shall have more individual bargaining counters too small and too biased for the negotiating process.

Test Suspension as an Example

The recent negotiations on weapon tests may prove to be typical. First, there has been almost no public discussion of whether the further testing of weapons and weapon effects would really be conducive to the development of greater bilateral military stability or instability over the coming years.* Even if the public could be got interested in this crucial question, it would be unlikely to have the information it would need to judge the answer. (There has been a good deal of public discussion of the merits and possible demerits of preventing the further spread of nuclear weapons to small countries, but remarkably little discussion of just how a test ban would obstruct the spread.) Second, while it may seem a mischievous stroke of fortune that somebody discovered, between the two conferences, facts or ideas that made the policing of a test ban appear more difficult than it had appeared the year before, this may be exactly what we have to expect in every case. If today we had "completely solved" the new technical problems introduced by the "decoupling" technique, we should still have to be prepared for somebody's discovering next year a new possibility that had been overlooked, one that contemporary detection technology could not yet cope with.

The test-ban discussions also illustrate that, when an issue has been narrowed down, the bias in the advantages may seem to outweigh the joint advantages. There is more controversy, and understandably so, over whether a prohibition on small-weapon tests is in the American interest, than on whether a prohibition covering the whole spectrum is.

But of all the characteristics of the present test-ban negotiations, the most significant may be that we have had a moratorium for some time without a formal agreement. (We do not, of course, have rights of inspection; so we cannot be sure that the moratorium has been kept; but it likely has been, except possibly for the most easily disguised tests.) And this moratorium resulted from no detailed negotiations, no careful specifications, and no written documents to be initialed and ratified. I do not think this result can be wholly explained by the pressure of public opinion. Part of the motivation must be that, whatever one side is sacrificing in improved technology, the other side is also foregoing tests, and each would probably resume them if the other did. Thus the main sanction of an arms-control agreement—the expectation that each will abstain only if the other does—is probably present in this case. It is therefore a genuine instance of "arms control." If it suffers from being tentative, temporary, qualified, and conditional, so might any arms-control agreement, even if duly negotiated and signed; furthermore, who can say yet that the present "agreement," if such we may call it, will not be of some duration?

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* That is, whether further testing would mainly facilitate the development of more secure retaliatory weapon systems with better communication and control, less subject to accident and false alarm, or instead would mainly enhance the potency of weapons for pre-emptive attack and aggravate the urge, when in doubt, to strike quickly and without restraint. The answer is by no means obvious for the period immediately ahead. It should be noted that tests involve not only new-weapon performance but weapon *effects* on previously untested targets, and the latter may be especially relevant to such things as anti-ICBM defense, civil defense, and the vulnerability of fixed or mobile weapons, warning systems, and communication and control systems.

Informal Arms Understandings

Here, I think, we have an important clue to a process by which arms control may be reached, and the kinds of arms control that can be reached by that process. Maybe arms control is destined to be something more informal than is suggested by the great diplomatic deployments in Geneva. Maybe limited measures of arms control can be arrived at by quite indirect and incomplete communication; maybe they will take the form of a proposal embodied in unilateral action (or abstention from action) which continues if matched by corresponding action on the other side and only for so long as it is. Maybe instead of *arguing* about what we should do, we will simply do it and dare the other side to do likewise, or do it and quietly suggest that we would like to keep it up, but only if they find it in their interest to do something comparable.

But if arms control is to be arrived at by a more tacit and informal process, and if we are going to call "arms control" any of the military things that we and the Russians abstain from because of an awareness that as long as each abstains the other probably will too, we should look around and see whether we do not already have a good deal of arms control. If we have, we should look at it closely to see what lessons we can draw.

Offhand, it appears (but a more imaginative examination might prove otherwise) that the tacit understandings we have with the Russians concern what we do with our weapons more than what we possess.* We seem to have some understandings about traffic rules for patrolling bombers; there are apparently certain lines we stay on this side of, lines the Russians presumably can recognize, the crossing of which they can probably monitor to some extent. This is certainly a restraint that we unilaterally observe in the interest of reducing misunderstandings and alarms. As far as I know, the traffic rules are communicated, not explicitly, but simply by behaving in accordance with them (perhaps *conspicuously* in accordance with them) and possibly by having chosen the dividing lines in such a way that their significance is recognizable. We both abstain from harassing actions on each other's strategic forces; we do not jam each other's military communications, scare each other with fallout from weapons tests, or wage surreptitious peacetime undersea wars of attrition.† We may yet develop tacit understandings about zones and traffic rules for submarines, and may (or may not) develop a tradition for leaving each other's reconnaissance satellites alone. We both very obviously abstain from assassination. The Russians recently "negotiated" (by a process of nudging) a sharper understanding about sharing the Pacific for target practice. It remains to be seen whether the U-2 incident causes certain tacit or latent understandings to come unstuck.**

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* A possible exception is civil defense. The extraordinary aversion to civil defense in the United States Government must be complex in its explanation; but an element is very likely a belief that a genuine civil defense program might open up a new dimension of the arms race, leading either to a "civil-defense race" with the USSR or just to an aggravation of the arms competition. The same may be true in the USSR. An interesting question is how much "clandestine" civil defense the Russians are undertaking, and their reasons for keeping it private. (In pointing this out, the author is not trying to justify the aversion to civil defense.)

† Not yet, that is, or not very much. Preserving some of the mutual restraints we now enjoy may be as important an "arms-control" objective as creating more.

** It seems a correct interpretation that there is still some element of implicit understanding about not transferring nuclear weapons to other countries. Its status is presently a great deal more ambiguous than the author expected a couple of years ago; nevertheless there must be a general awareness on both sides that the restraint of either will be weakened or dissolved by promiscuousness on the other's part.

In all likelihood we may abstain from the use of nuclear weapons in some limited war, though both sides often seem to denounce officially the notion that a serious limited war should be, or could be, fought without nuclear weapons. Here is an interesting case of an arms limitation that may be tacitly recognized by both sides, and recognized only because each thinks the other may observe it too, yet one that is not only not formally agreed on but even denounced and denied by both sides. It seems doubtful whether this tacit understanding could be made much stronger by a written document.* A restraint on the use of nuclear weapons may be more persuasive if it seems to rest on the enemy's own self-interest—on his understanding that if he abstains we may too, but only if he does—than if it pretends to rest on the power of a written agreement or on a fiction of "good faith."

Limited War as "Arms Control"

In fact, all of the tacitly agreed limits that do apply, or may apply, in limited war can be construed as a kind of informal arms control tacitly arrived at. My impression is that we and the Russians will go to some length to avoid having American and Russian troops directly engage each other in a limited war, simply because such an engagement might create extremely unstable expectations about whether the war could remain limited. We and the Russians both recognize many legalistic limitations in war, such as the distinction between North Koreans and Chinese, between volunteers and regulars, between the provision of materials to an ally and the provision of manpower, between doing an ally's reconnaissance for him and doing his bombing, perhaps even the distinction between local airfields that are fair game because they are on the ground within a disputed country and the decks of carriers offshore that might for some reason be construed as "sanctuary."

Most of these limits are arbitrary, conventional and casuistic—purely matters of tradition and precedent. For that reason they are uncertain and insecure; nobody is even nominally committed to honor them. But they demonstrate that it is possible for potential enemies to arrive tacitly, or by indirect communication, at a meeting of minds about some rules, and about how to interpret intentions through the way one operates and deploys his resources. Most important, the limits that can be observed in limited war are a powerful demonstration that sheer self-interest—the recognition of a need to collaborate with an enemy in wartime, to reach understandings that transcend the formalities of explicit communication; the recognition of a mutual interest in avoiding accidents, incidents, misunderstandings and unnecessary alarms, and in holding to any constraints that can be found—can provide potent sanctions that need not rest on explicit negotiation and formal agreements.

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* It could be made much stronger by various unilateral actions. One would be to increase our *capability* to get along without nuclears in limited war. Another would be to add symbolic support to the understanding; the test-ban negotiations—especially if a formal agreement is reached—almost certainly do this, whether they are intended to or not.

We may, then, increase our understanding of the nature of arms control, what it rests on and how it may come about, by recognizing limited war as a kind of arms control in itself. And perhaps it differs from peace time (i.e., cold-war) arms control less than we customarily think. Perhaps the psychology and the sanctions and the mode of communication, the kinds of reasoning involved, the lack of formal agreement or even acknowledgment, that typify limited war, represent a more central and typical process of international negotiation than we usually give it credit for.

There is another aspect of limited war that deserves emphasis in this connection. The limits in limited war are arrived at not by verbal bargaining, but by maneuver, by actions, and by statements and declarations that are not direct communication to the enemy. Each side tends to act in some kind of recognizable pattern, so that any limits that it is actually observing can be appreciated by the enemy; and each tries to perceive what restraints the other is observing. For that reason the limits themselves must be clear-cut, must be of an "obvious" character, must be based on qualitative distinctions rather than matters of degree. They must not be too selective, too gerrymandered in discriminating between what is inside and what is outside the limit. They must attach themselves to benchmarks, demarcation lines, and distinctions that come naturally. They must have simplicity. They must take advantage of conventions and traditions and precedents that exist, even if the precedents and traditions are biased between the two sides or a nuisance to both sides. Often they must involve all-or-none distinctions, or across-the-board distinctions like that between land and water, between material and manpower, between two sides of a border, or even some arbitrary but potent and highly suggestive feature like a parallel of latitude.*

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* For an extensive analysis of tacit bargaining, with special reference to limited war, see Chapters 3 and 4 and Appendix A of T. C. Schelling, *The Strategy of Conflict*. Cambridge: Harvard University Press, 1960.

This is certainly true in the case of the use of nuclear weapons in limited war. It is enormously more likely that a limit against any use of nuclear weapons could be recognized, sensed, and adhered to by both sides on condition that each other observe it, than that any particular quantitative limitation, target limitation, fission vs. fusion limitation, or limitation based on who is the "aggressor," could be jointly and tacitly converged on by the participants.

But the same is certainly true of a test suspension. A tacitly reached moratorium on testing nuclear weapons—mutual and reciprocal but essentially unilateral on both sides—is much more likely to be stable and durable, much less likely to be eroded by ambiguous behavior, than a selective moratorium. If we and the Russians are very selective in our unilateral restraints, each choosing the particular yields, altitudes, fission-fusion combinations, and localities for tests, it seems unlikely either that both sides will hit on the same limitations and maintain them with confidence, or that both will hit on "equivalent" though different restraints.

To some extent, then, the gains and losses of a particular agreement, i.e., the way any particular understanding that is reached may discriminate between the two parties (or among more than two parties), are likely to be dictated somewhat by the elements of the problem, and not altogether by the detailed preferences of the parties to the understanding or their bargaining skill. An absolute ban on weapon tests, for example, or any other across-the-board prohibition, is somewhat arbitrary in the way it distributes the advantages; but perhaps some of its appeal is precisely in the fact that it is somewhat arbitrary, somewhat determined by chance or by the very structure of the problem, dictated by circumstances rather than by either side to the other.

Communication and Understanding

If an important part of our arms control—or let us call it "mutual arms accommodation"—with our enemies is going to be tacit and informal, a matter of reciprocated unilateral actions and abstentions, we need to take seriously the problem of communicating with our enemies about what we are doing, and of reaching understandings with them. In some respects informal communication is easier, in some ways harder; the process is different from that of formal, explicit, detailed negotiation, and imposes different requirements. Informal communication is usually ambiguous; a government speaks by hint as well as by overt statement and proposal, it speaks indirectly through the medium of press conferences, leaks of information, and remarks to third parties. It speaks with many voices, in the executive branch, in the congress, and even in private articles and news stories that are "inspired" or are inferred to be so. And it speaks through the actions it takes.*

The differences should not be exaggerated; even when large teams of professional diplomats and technical experts are assembled in Geneva, much of the communication takes these other forms. Nevertheless, the strategy of communication is different, particularly because of the greater need in informal negotiations to reach a real understanding. In formal and explicit negotiation, what eventually matters is to a large extent what gets written down and agreed to; even if there was not a meeting of minds, there may have been a meeting of words that provides a record of the expectations of both sides and the obligations perceived. In informal negotiation the ultimate sanction depends less on a piece of paper than on the clarity of the understanding reached. If one behaves in a particular way, in anticipation of the other's reciprocation, there is a need to make clear precisely how one is behaving, with what mutual purpose in mind, so that the other can read the proposal in it, infer what would constitute reciprocation, and design its own behavior accordingly.

There is furthermore a greater need to be persuasive. In explicit negotiation, it may be possible to reach an agreement whose terms are reasonably well understood without agreement on principles or any reciprocal understanding of each other's motives. If the letter of the agreement is clear, the spirit can remain somewhat in doubt. In informal negotiation, the spirit bears most of the burden; and if the *idea* behind what we think we are doing is not perceived by our partner (enemy), what we expect of him—or what we may reasonably be expected to expect of him—may be too dimly perceived to be the basis for genuine reciprocation.

Suppose we decide to put more emphasis on ballistic-missile submarines, for example, in the belief that they are peculiarly "stable" weapons because of their lesser susceptibility to destruction in case of a surprise attack and because they are not so much under obligation to strike quickly in the event of an ambiguous warning (or war itself), or else because their smaller warheads, with possibly a lesser degree of accuracy as compared with ground-based missiles, makes them less of a threat to the enemy's retaliatory forces and more of a genuine deterrent. Suppose we decide that we could afford to do this only if the enemy himself oriented his own strategic program toward similarly "stable" weapon systems. It might not be at all clear to the Russians what our motives are, or what the conditions were for our going through with the program. Or suppose we have a crash program for the development of a more secure ground-based missile force, this program to be financed by a sharp increase in the defense budget, with a good deal of expenditure on command, control, and communication arrangements so as to reduce both the vulnerability of our weapons and their sensitivity to accident or false alarm. In particular, suppose that our budget rises because of increased outlays associated with our desire for a *slow* reacting force, rather than one that must react rapidly. In such circumstances, our actions may be stabilizing or destabilizing, depending on whether the enemy can percieve that we are making the world safer for him rather than increasing his need (and ours) to jump the gun in a crisis. If we institute an airborne alert, it may be important to do so in a way that enhances the apparent as well as the real security and stability of our retaliatory weapon systems. This might mean that we would have to choose deliberately, say, flight patterns that manifestly enhance the security of our forces rather than the speed with which they could initiate a surprise attack of their own.

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* In a sense, the abortive summit conference of May 1960 did not involve less "negotiation" just because the meeting never took place.

By far the most important prerequisite is that we understand our own motives well enough to take actions that are consistent with a deterrent philosophy, and well enough so that we can articulate it to ourselves. If we have such a philosophy, and if our actions are consistent with it, and if for our own purposes we articulate that philosophy in explaining our budget decisions here at home, we are probably well on the way to conveying that philosophy persuasively to our enemy, if he is at all receptive. A special problem here is that our overt position on disarmament must not be too inconsistent with the philosophy that we are trying to display and get across to our enemy. If, for example, we really believed in a policy of collaborating with the Russians to develop a stable situation of mutual deterrence, and if we determined to make important changes, to this end, in the configuration of our weapons but these changes were not in the direction of general disarmament, we would put a double burden on our communication if the front we presented on arms-control questions bore no relation to that philosophy. This does not necessarily mean that we have to speak in our formal disarmament diplomacy in a manner that is sincere and consistent with what we are fundamentally trying to get across to the Russians. It may just mean that our insincerity should be as manifest as the inconsistency, so that when we do contradict ourselves the Russians know that this is for show and that they should look for the real message elsewhere. Still, it would help if we could find the diplomatic courage to shift even the formal discussions of arms control more into accord with our basic military policy, at the same time as we try to adapt that military policy in directions that the Russians can appreciate and reciprocate, so that disarmament negotiations can help a little, or at least hinder as little as possible, the development of a genuine understanding.

Even so, it is still an unanswered question whether the Russians are at all disposed to participate in any "mutual arms accommodation" with us, beyond what we already do in a tacit way. And it is a difficult technical question whether, even if they are disposed to cooperate with us and appreciate the principle of stable retaliatory systems with minimum proclivity toward false alarm and minimum temptation toward surprise attack, there are any promising actions to be undertaken. Weapon systems can rarely be classified indisputably as first-strike or second-strike weapons, as "accident-prone" or "accident-proof"; a good deal of technical analysis has to lie behind a judgment, many of the technical judgments may not be made equally by us and our enemies, the judgment has to be made in the context of an evolving weapon system for which facts are really only forecasts, and what is known today may no longer be true tomorrow. It is, furthermore, too much to expect the massive bureaucracy of our defense establishment and our foreign service, and the partisan conflicts in Congress, to produce and maintain a coherent philosophy and transmit it with high fidelity to a suspicious enemy whose receptivity and reasoning processes we can only poorly evaluate. But it is worth trying.

Reciprocated Development of Stable Armaments

One possibility, already adverted to, is to design our military forces conspicuously and deliberately in the direction of deterrence, stability, and slow reaction. That is, to articulate as a policy the design of a strategic force that is peculiarly good at waiting out crises, at surviving a surprise attack, and at punishing an attacker *ex post facto*, and not particularly good at initiating a preventive attack, not in need of responding rapidly to warning.

This may not be a bad policy to follow unilaterally; but the advantage of pursuing it is greater if the enemy pursues it too. The more each side perceives the other as designing his force for a sudden pre-emptive attack in a crisis, or for a premeditated surprise attack, the more one is tempted himself to develop a quick-reacting system, one that is peculiarly suited to catching the enemy's military forces before they have left the ground. Thus to some extent such a policy is a conditional policy; the motive is greater if the principle is reciprocated by the enemy.

It would be extraordinarily difficult, perhaps impossible, to negotiate a detailed understanding of precisely what kinds of weapons in what configurations, and how deployed, would meet the "stability" criterion. For that reason the idea may not be one that lends itself to explicit detailed negotiated agreements. But that does not rule out the possibility that both sides may perceive value in pursuing such policies in a general way, and may recognize that their own behavior not only helps the other side pursue a similar policy but helps to induce it by the tacit promise of reciprocation. As mentioned above, we already do this in such matters as the traffic rules we both unilaterally observe and reciprocate; there may be a good deal of room for gradually extending this kind of reciprocal unilateral action, even though the subject may never appear on the agenda of a diplomatic negotiation.

Compared with a *peaceful* world disarmed, schemes to stabilize mutual deterrence are a poor second best; judged against the prospect of war, measures to make it less likely may be attractive. This point of view will not appeal to any who believe that war results from the sheer existence of arms and the temptation to use them, or from the influence of militarists in modern society whose prestige increases in proportion to the arms budget, and who believe that distrust is only aggravated by people's acting as though distrust exists. History shows, it is said, that man cannot live in a world with arms without using them. History rarely shows anything quite that universal; but even granting it, the question is not whether it is asking much of man to learn to live in a world with arms and not to use them excessively. The question is whether it takes more skill and wisdom for man to learn to live in a world with arms and not to use them than it does for man to disarm himself so totally that he can't have war even if he wants it (or can't want it any longer). If modern social institutions are capable of achieving disarmament in the first place, and of avoiding arms races in perpetuity thereafter, perhaps they are capable of supporting a world with arms without war. Those who argue that peace with arms is impossible but act as though peace and disarmament are not, may be using a double standard.

And it must be remembered that total disarmament, even if achieved, does not by itself preclude subsequent arms races; nor does a good start toward total disarmament preclude a violent reversal. To the extent that an arms advantage is more easily obtained when the level of armaments on both sides is low—to the extent that the consequences of cheating are greater in a world with few arms—arms races might become more violent, the lower the level of armament from which they start. Particularly in a world in which the pace of scientific progress is rapid but jerky, uneven as between countries, and full of opportunities and uncertainties for weapons development, it is not at all clear that the world would be less uneasy about arms advantages if each side continually thought of itself as nearly naked. What can explain the complacency of the American response to the first Soviet sputnik except a feeling (superbly rationalized) that the existing level of arms provided so much security that no single new achievement, or even a revision of the comparative time schedules by a year or two, could quite upset the balance.

Exchange of Stabilizing Information

Another area of possible cooperation is in damping the arms race through the exchange of information. I am not much impressed with the budgetary fury of our participation in the arms race, but it is not hard to imagine that the budgetary arms race might get into much higher gear. If it does, part of the motivation (at least in this country) may be due to uncertainty about the level of armament on the other side. The "missile gap" that one estimates, or feels obliged to assume to exist in the absence of information, may exceed the actual missile gap, causing a more frantic increase in armaments than would be undertaken with better information. And it may induce reciprocal action on the other side, which also wishes to avoid an intolerably unfavorable imbalance.

To illustrate: suppose that either side felt reasonably secure against sudden attack as long as its enemy's numerical superiority in missiles never reached, say, 2:1. In this case, just knowing what each other possesses and is producing could make possible a stable equilibrium at a modest level of strategic armaments, while ignorance of the enemy's strength might seem to require an unlimited effort to avoid falling too far behind. With actual weapons such simple calculations are of course impossible; but the principle is valid.

An important difficulty of applying it, though, is that the ways by which one can get authentic information about the other's present and projected strength may provide more strategic information than the other side can tolerate.* A special difficulty is that the Soviets may already know most of what they need to know for this purpose; it is mainly we who do not.

But it is interesting that they might possibly prefer that we know the truth. If in fact we are on the verge of a crash program based on an exaggerated estimate of what they have already done, it could cost them money (and perhaps an increase in the risk of war) to keep up with us. It is also interesting that the truth is probably not something that they could readily reveal on their own. They have to find some way of giving us evidence for believing the truth (or a less exaggerated estimate of the truth) and give it in a way that does not yield targeting and other information that they would find intolerable. The fact that this intelligence gap is mainly on our side does not preclude Soviet interest in some means of conveying the information to us, and it does not obviate the need for cooperative techniques for receiving it.

Measures for Reassurance on the Brink of War

Measures to prevent "accidental war," war by misunderstanding, war by false alarm, are another possibility. One aspect of this has been mentioned: the reciprocal development of the kinds of forces and modes of behavior that minimize accidents or their consequences, minimize alarms and misunderstandings, minimize the need to react quickly in the face of ambiguous evidence. But there is another type of joint or reciprocal activity that could help. It would be to arrange in advance, even if crudely and informally, communication procedures, exchange of information, and inspection facilities, for use in the event of an accident, alarm, or misunderstanding that created a crisis. Part of this is just procedural—making sure that we and the Russians have the same idea about who gets in touch with whom when communication or bargaining is suddenly required. Part of it is intellectual—thinking ahead of time about how one would go about reassuring the Russians in the event they had a false alarm, and what we could demand of them for our own reassurance if we ever got ambiguous evidence. Part of it is physical—making sure that, if we should need inspectors on a particular scene within a few hours to verify that something was an accident, or to verify that the Russians were calm, or to verify that the Russians were not taking actions we thought they were taking, the necessary inspectors and equipment would be available within a few hours' travel time from where we would need them. Just having some Russians available at strategic points around the United States, able to see things with their own eyes if we suddenly wanted them to and able to report home instantly through authentic channels, might be useful someday. And if we ever want them, we may want them in a hurry; there may not be time to identify them, brief them, ship them over here, and train them for their job, once the accident occurs or the crisis is on or the misinformation filters through the Russian warning system.*

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* Also, one side yields a bluffing or bargaining advantage if it reveals that its weaponry is less impressive than may have been thought. It loses, too, the possibility of surreptitiously achieving a dominant superiority. But losses of this kind are the price of arms control in the first place.

"Crash" Arms Control

There is a more ambitious possibility. Neither we nor the Russians at the present time take arms control terribly seriously; we do not view it as an alternative to a war that is imminent. But it is not impossible to imagine crises in which the likelihood of immediate war would become a grave preoccupation. Once the threat of imminent war rises above some threshold, the mere consciousness that each side is preoccupied with it—and with the importance of being the one to start it, if it should come—will aggravate the propensities that already exist. It is perfectly conceivable that in a real crisis there would be a sudden and drastic change in the attitudes of both sides toward arms control. "Preventive arms control" might begin to look like a risky but attractive alternative to a possibly inevitable pre-emptive war. Sudden and drastic "measures to safeguard against surprise attack" might have to be negotiated on an acutely demanding time schedule.

If so, success may depend on whether one or both sides is intellectually prepared for the contingency, whether some understandings have been reached in advance, and whether certain facilities can be improvised to monitor whatever arrangements might be forthcoming. One of the important "limited" arms-control measures that we might take in advance of such a crisis, either by ourselves or with our enemies, either informally or explicitly, is a development of understandings, procedures, personnel, and equipment, of an imaginative and adaptable sort, capable of going into action at such time as we and the Russians both decide that now is the time for arms control and we can't wait.

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* A more extensive discussion of this point will appear in T. C. Schelling, "Arms Control: Proposal for a Special Surveillance Force," *World Politics,* October 1960.

Arms Control in General War

A final possibility, a pessimistic but a serious one and one suggested by the analogy between arms control and limited war, is the role of arms control in general war if general war occurs. We usually think of arms control or deterrence as having failed if war breaks out; and so it has, but it can fail worse if we give up at that point. It is not entirely clear that a general war—a war between the USA and the USSR, involving their strategic forces on a large scale—would necessarily be unlimited either in the way it would be fought or in the way it would be concluded. Particularly as we come to think about an inadvertent war—one that results by some kind of accident or misunderstanding, or one that is reluctantly initiated by the Russians or by us in the belief that it is urgent to pre-empt at once—it is worthwhile to consider whether fury is the only guide we need in conducting the war, and whether the exhaustion of weapons on both sides is the only condition for terminating it.

It is commonly taken for granted that if the Russians initiate a general war it would be in a vicious effort to exterminate us both as a nation and as a people, and that they would be so impatient to do this as to spend valuable weapons to create civil damage at the outset. But it is not obvious that a coldly calculating enemy would afford himself the luxury of going after cities and people when there are more urgent targets that he has to destroy in order to reduce the scale of our retaliation. Nor is it obvious that an impetuous attacker, one whose motivation is partly the fear that if he does not strike first he will be second, would be immune to the thought that he might want to surrender if the thing went badly, to accept our surrender if it went well, or to negotiate a truce between those extremes. If there is no immediate strategic need to kill our people, it may occur to him that they are worth more alive than dead; the threat of killing them gives him something to bargain with in the course of the war or at its termination. Similarly for us: if the war was a mistake we might be more interested in minimizing the consequences of the error, whosever error it was, and in maintaining the possibility of a negotiated outcome that limited damage on both sides. For this bargaining purpose, live Russians and our unspent weapons are assets, and about the only ones we'd have.

The subject is a complicated one and cannot be decided here. It has to be acknowledged that there are dangers in suggesting to the Russians that we are even aware of the possibility that an attack on us might not be cataclysmic for us both. But the possibility is so universally unmentioned and so terribly important that it deserves to be brought into the open for study. Its relation to arms control is that the mere possibility of limiting a general war between us and our principal enemy may depend on some understanding, tacit and informal as it may be, that we share ahead of time. There may be little national advantage in abstaining from certain targets in the event of war, or in attempting to communicate, unless the enemy can be alert to what is going on.

Terminating War by Arms Control

Terminating a war through anything other than the sheer exhaustion of weapons on both sides would require some form of arms control. It is a noteworthy characteristic of a possible World War III that even unconditional surrender may be physically impossible. How do the Russians persuade us that they have destroyed (or are prepared to destroy or deliver us) some or all of their significant weapons and are prepared to submit to our political demands? We cannot even trust them not to test weapons under a test-suspension agreement; in circumstances infinitely more desperate, when a one-hour pause in the war may be of strategic benefit to somebody, if they send us an urgent message acknowledging their guilt in the war and proposing that we preserve our world by letting them surrender to us, are we likely to be able to do anything? If they are fooling, and if we are fooled, the cost will be tremendous; if they are not fooling and we choose to ignore them, the cost will be tremendous. Can we think of what they might do to prove that they mean it? Have we got the facilities to monitor them and to police them? Have we incorporated in our strategic forces, and in the operating doctrine of those forces, recognition of their potential role in policing the disarmament by which the war might be brought to a close?

Actually "surrender" is a poor word here. Anywhere between the two extremes of unconditional surrender by one side or the other, the truce or understanding or scheme for bringing the war to a close might better be described as "disarmament" or "arms control." Historically one might have allowed an enemy, when he "conditionally" surrendered, to keep some purely defensive weapons as a hedge against the victor's violating his promise. This is a kind of asymmetrical disarmament scheme. In the future, at the close of a general war, one might have to allow the conditionally surrendering enemy to retain some retaliatory weapons, these being the only kind that two major powers can use to enforce promises from each other. In effect, "measures to safeguard against surprise attack," possibly one-sided, possibly bilateral, and certainly more drastic than any that have yet been considered, might be the minimum requirement of a conditionally surrendering enemy.

Thus anywhere between the two extremes of total surrender, the outcome should be viewed as a disarmament process, with the asymmetry presumably reflecting the degree of victory or defeat. But as remarked above, even the extremes of unconditional surrender require much the same kind of procedure for mutual relaxation, cessation of hostilities, inspection, enforcement, and so forth. Any general war that is terminated by a bilateral understanding, by anything other than the independent exhaustion of weapons on both sides, requires something in the nature of an enormous, complex and dynamic scheme for arms control.

If this possibility is to be left open, we need to anticipate it in the design of our strategic forces and in our plans for their use. It may require special facilities and equipment to bring a war to a close, of a kind not necessarily provided for in a plan that considers only the contingency of an all-out war to the finish. But it also requires some mutual awareness ahead of time, on the part of both our enemy and ourselves, and perhaps some crude and tacit, if not careful and explicit, understanding about the modes and techniques of negotiation in the event of war.

JEROME B. WIESNER

Comprehensive Arms-Limitation Systems

I. INTRODUCTION

Mankind's almost universal desire is to halt the frightening arms race and to provide, by rule of law, the security now sought so futilely from nuclear armaments and ballistic missiles. While the goal is clearly visible, the course is not; until now it has not been possible for East and West to agree upon a mutually acceptable disarmament or arms-limitation scheme. This chapter will explore the variety of problems which must be solved if comprehensive arms-limitation systems are to be made acceptable.

During the past fourteen years international arms-control conferences have occurred more or less regularly. Starting with the meetings of the United Nations Atomic Energy Commission in 1946, which spent many months considering the Baruch version of the Acheson-Lilienthal proposal for the control of atomic energy, there have been a series of international meetings between the representatives of the Eastern and Western powers in an attempt to arrest the arms race. In 1952 the United Nations Disarmament Commission began a series of meetings in an attempt to get agreement on a plan for general disarmament. The Commission did not succeed in initiating serious dicussions during its 1952 and 1953 meetings and was essentially moribund from 1953 until mid-1954. Then, and again in 1955, the Commission held a series of productive meetings in London, which were followed by the Summit Meeting of 1955, the London meetings of the United Nations Disarmament Commission in 1957, the Geneva Conference of "the experts to study the technical means of monitoring a nuclear test ban," the Conference on "the means for reducing the dangers of a surprise attack," the political conference to prepare a treaty prohibiting the testing of nuclear weapons and, finally, the Ten Nation Disarmament Conference that convened in Geneva in March 1960. It is interesting to note that this series of international conferences oscillated between attempts to achieve very extensive arms-limitation agreements and efforts to find meaningful limited measures which could be implemented in spite of broad areas of disagreement. It has become evident by now that there is not an obvious, quick and easy path to military security through arms limitation. Nearly all significant limited arms-control measures, such as the nuclear test ban, the demilitarized zone in Europe or the open-skies proposal, are judged to be unsafe—though it is not clear that they really are—and therefore undesirable by one or more of the many parties who would have to accept them. The limited proposals require either the Soviet Union and its allies to accept more inspection than they are prepared to have without extensive disarmament, or the West to accept arms limitations with what to it appears to be inadequate inspection. These asymmetrical views are the natural consequence of the security problems faced by each group.

II. WHAT MAKES ARMS-LIMITATION AGREEMENTS DIFFICULT?

Obstacles to Achieving Arms-Control Agreements by Means of Limited Measures

Experience indicates that individual projects or proposals, no matter how promising, always will be evaluated in a negative state of mind born of fear. I have had considerable opportunity to observe this effect in the operation of the American government, and I assume from published statements made by Soviet leaders, and from discussions with many Soviet disarmament experts, that a similar protective mechanism operates there.

We are confronted by a serious communication block. In conflict situations between individuals, and in conflict situations in which individuals act for nations, statements of antagonists are evaluated not in terms of the intended meanings, but rather in terms of the most threatening alternatives. This is particularly true when survival is believed to be at stake. When this happens, there can be no meaningful communication. Every proposal by either side is scanned for the hidden purpose. The entire history of the atomic control negotiations is a demonstration of this effect. Starting with the Baruch-Lilienthal plan and coming up to the present negotiations with the Soviet government regarding a nuclear test ban, there has been a reluctance by all parties to consider that such proposals are put forward in good faith.

To succeed, arms-control measures must be of such a nature that their implementation gives participants a feeling of greater security, not less, and they should also be of such a character that they promote mutual understanding and trust. The problem confronting us is to design a comprehensive arms-control system which commences with low-risk measures that can be carried out in the atmosphere of suspicion and fear, but which clearly leads to the ultimate objectives. Thus, by having clear-cut and desirable goals, it may be possible to gain acceptance of the initial steps.

The various limited arms-control measures discussed at the disarmament conferences have been unacceptable for many reasons. First of all, there is much evidence to support the allegation that until recently neither side was sincerely attempting to reach agreement on disarmament or arms limitations. Furthermore, none of the participants in the conferences have been sufficiently prepared to permit them to negotiate with confidence. The American delegations to the disarmament discussions, to the nuclear test ban conferences and to the surprise attack conferences had very inadequate technical preparation to support them in the discussions. They were further handicapped by the lack of any definite national position on the subjects being discussed or even of any guidance regarding rational objectives. There is considerable evidence to support the position that the Soviet delegations were not much better prepared. In fact, it often appeared to Western observers that the Russian groups were even less well prepared technically than they.

Obstacles to Achieving Arms-Control Agreements by Means of Comprehensive Systems

The design of a satisfactory comprehensive arms-control system, i.e., one attempting to eliminate or control all major weapons of war, may involve complex interrelationships between the various weapons systems affected and between each of them and whatever inspection system is required to monitor it. The complexity of the inspection and control system will be determined by the exact nature of the weapons limitations to be imposed; some disarmament or arms-control systems which have been proposed appear to require elaborate inspection and control systems, others require much less.

Up to the present time, there has not been adequate examination of the technical details of any comprehensive system to make possible a really satisfactory evaluation of it. Unfortunately, in this circumstance, the West has always been suspicious of Soviet proposals, and furthermore has generally been ultra-conservative in the inspection requirements it places upon any system. Until there is an adequate understanding of the various components which go into the make-up of the comprehensive systems, it will be difficult, if not impossible, to arrive at a mutually acceptable system.

In this paper I propose to examine the inspection problems and the security problems associated with elimination or limitation of the major weapons systems now in existence, and I will also examine the problems of technological surprise created by the on-going research activities. Following this I will examine three possible forms of comprehensive arms-control systems.

In the design of a comprehensive arms-control system, not only are the ultimate objectives important, but the situation which will be created during the implementation phase must also be taken into account. It is extremely important that the timing, the build-up of inspection, the decrease in weapons, and the geographic distribution of the various activities must all be considered simultaneously—otherwise systems will be proposed which will appear too dangerous to one side or the other.

From the discussions in this paper, it will be obvious that there are many gaps in my present understanding of the problem and that considerably further thinking and study is required before any one of these systems is likely to be accepted. The systems examined should not be considered as definitive proposals, but rather as being illustrative of the range of problems which need to be examined. In spite of the reservations expressed above, I am hopeful that a comprehensive arms-control system, acceptable to both the East and the West, can be developed, and that it will gain acceptance more easily than a series of individual limited measures.

There are many reasons why I suspect that a comprehensive system may be easier to negotiate than a series of independent limited measures worked through one at a time. If there exists an agreed upon long-term goal, a plan for reaching it by means of a sequence of arms limitation measures and a timetable for doing so, there will be an enormous interest in the ultimate objective and individual steps will not have to be as finely balanced as if they were likely to persist for all time. Second, the inspection required to safeguard some limited measures absolutely may appear to be almost as great a breach of Soviet security as the inspection required for a comprehensive system. In fact, really adequate inspection for limited measures may be more difficult to achieve because the various components of an inspection system will reinforce one another. Finally, when extensive disarmament has taken place, there will be no need for military secrecy, so that the environment in which the inspection will have to function will be much more favorable for effective control. I do not mean to say that there are no useful limited measures; there are probably many; for example, an arms-free zone in central Europe could contribute greatly to stability if it could be negotiated.

Obstacles to Reaching any Agreements

Specific and overriding fears influence the point of view of each of the groups negotiating an arms-control agreement. They can cause different nations to react to a given proposal in very different ways. Some of the more important of these fears are:

On the side of the Soviet bloc:

(a) Concern about American bomber bases and missile bases surrounding the territory of the USSR—not only about the possible deliberate use of these weapons, but also about the dangers of the so-called "accidental war" occurring as a result of tensions in areas where there are extensive military forces.

(b) Fear of espionage; this factor is related to the previous one; much of the Soviet military security in the face of superior and close-by nuclear striking power has been obtained by carefully guarding knowledge of the location and size of important USSR military targets. It should not be surprising, therefore, if Western emphasis on inspection is viewed with considerable suspicion.

(c) Concern about a rearmed, reunited Germany.

(d) Widespread belief that capitalistic states may deem military adventure necessary to support their economies. This view, formerly widely held, seems to be a much less significant concern of Soviet leaders now than it was in the past.

(e) A belief that the capitalistic states are dedicated to the extermination of Communist or socialist states.

(f) The fact that the Soviet Union, its allies and satellites are outnumbered in the United Nations and cannot ever expect to get fair treatment.

On the Western side:

(a) Fear that the large Soviet land armies could, and probably would, occupy Western Europe and many other areas of the world if not "deterred" by the threat of atomic retaliation or by adequate conventional forces.

(b) Widespread acceptance of the view that the Soviet government is dedicated to the extermination of the Western way of life by any means available to it, including military force if its use is not too costly. This has its extreme form in the fear of a surprise attack. This fear increases continuously as the evolution of nuclear weapons and ballistic missiles makes such an attack appear to be easier to carry out and harder to defend against.

(c) Fear of the unknown. Travel restrictions and other censorship devices imposed by the Soviet Union to provide it with military security, make it appear possible for that country to carry out large-scale military deployment unbeknown to the rest of the world. Many Western experts believe that it would be possible for a decisive missile force to be built up behind the Soviet security screen with little danger of detection. The fear of Soviet duplicity is so great among some Western experts who participate in disarmament planning that it is not possible to visualize a level of inspection which would actually alleviate this fear. Such individuals seem to prefer the unknown and the dangers of the arms race to arms reduction with any conceivable degree of inspection. Others would require a level of inspection so great that no nation, including ours, would be willing to pay for it.

(d) A fear of military action by local Communist groups within countries such as France, Italy, Burma, India, etc., supported by aid from the Soviet Union.

Can the Conflicting Security Requirements be Resolved?

Though many of the worries listed above are actually political, not military, in nature, they are affected by the military situation and will be affected by changes in the relative military positions of individual countries, whether due to unilateral actions or to arms-limitation agreements. Some of these problems will disappear as progress is made in limiting military force, others will have to be dealt with explicitly in negotiations.

One of the most serious stumbling blocks encountered in attempting to achieve agreement between the East and the West on arms-reduction plans is the seeming contradiction or conflict between steps required to reduce the fears and suspicions of both sides at the same time. The clearest example of this problem, and in fact the issue which has caused the most misunderstanding in all of the previous negotiations, is the apparent irreconcilability between the Soviet fear of espionage, which seems to dictate that there should be considerable disarmament before there is widespread inspection, and the Western fear that in the absence of an essentially perfect inspection system, the Soviet Union would be able to launch a successful surprise attack on the Western military forces.

These problems can be resolved, as will be shown in subsequent sections, provided there is adequate understanding and agreement on each side regarding the security considerations motivating the other, a considerable degree of objectivity in examining the consequences of various actions, and a sufficient understanding of the technical characteristics and actual performance of individual components of inspection systems to permit relatively objective assessments to be made.

It is unfortunately true, as was previously stated, that in the past there have been insufficient technical and military studies to permit adequate assessment of various alternative systems. Lacking sufficient understanding of basic matters, negotiating groups representing both sides have found being objective a serious liability and have therefore seldom attempted it. If progress is to be made in the future, the negotiating groups will have to be much better prepared and they will have to be determined to respect and consider fairly the actual, and possibly even the imagined, security needs of the other side. Furthermore, both groups must be realistic in their security objectives. That is, each must be prepared to accept some risks in implementing arms-control systems. The objective should be to find security systems less dangerous than the accelerating arms race rather than to achieve a system capable of providing absolute security, an obviously unobtainable goal. If this point of view were accepted by both sides, many different comprehensive arms-limitation systems capable of providing adequate security to all participants could be designed and in all likelihood one of these would be completely acceptable.

An even more serious difficulty encountered when attempts are made to judge disarmament proposals is the lack of explicit national goals or objectives beyond the statement of the national desire for a safe-guarded disarmament. In particular, there is no clear-cut understanding of the kind of political environment we desire to live in. The acceptability or desirability of many proposed disarmament systems depends more upon political issues than upon military safety, though this is rarely realized or admitted. For example, the USSR proposal for "general and complete disarmament" would probably result in a world safe enough for the two countries, but one in which neither the United States nor the Soviet Union would have any control of conditions in other parts of the world. Is either of us really prepared to accept this situation?

There are many reasons for being optimistic at the present time. Since 1957 a number of developments have occurred—some technical, some military, some political—for whose achievement a comprehensive agreement appears to be more urgent and possibly even more feasible than was the case then. The most significant of these developments are:

1. The development of long-range ballistic missiles. This has had a number of important effects. Ballistic missiles and thermonuclear weapons taken together create a situation in which it is unlikely that any nation can achieve, in the foreseeable future, an overwhelming military position. There has been an increasing acceptance of the idea that the continued arms race will result in less, rather than more, security for everyone. Missile developments have also made possible, at least in principle, the creation of a highly secure deterrent force. This prospect provides a means for overcoming the "clandestine weapon" difficulty always present in designing an arms-limitation system. This point will be examined in considerable detail later on.

2. The apparent willingness of the Soviet Union to consider the creation of an inspection system in parallel with the reduction in forces and weapons levels. This is undoubtedly due in part to the improved military posture the Soviet Union has achieved by the development of ballistic missiles.

3. Nuclear weapons developments which now make available adequate warheads for any military need which can be visualized as arising during the implementation phase of an arms-control system, so that further developments are not vital for the maintenance of an adequate deterrent posture.

III. OBJECTIVES OF ARMS-LIMITATION AND CONTROL AGREEMENTS

The first and foremost United States objective in seeking arms-limitation agreements is to improve the national security—both short-term and long-term. Presumably it is the same motivation that compels other nations to join with the United States in seeking such agreements. Clearly many partial measures will improve the national security in the short run, but in the long run only a cessation of the arms race and a great reduction—or, hopefully, the elimination—of all major weapons, in the framework of an international security system capable of preventing the reappearance of large-scale national military forces anywhere, can guarantee military security. Total disarmament with a genuine international security system should be the goal toward which we strive. However, as will be shown, there are many comprehensive arms-control systems short of this ideal which could make a significant contribution to national security.

Principles for a Complete Disarmament Program

The essential principles for a complete disarmament program were presented to the United Nations Disarmament Commission on 29 April 1952.[1] These general principles, which can serve as a background to a discussion of today's problems, are repeated here:

> 1. The goal of disarmament is not to regulate but to prevent war . . . by making war inherently, as it is constitutionally under the Charter, impossible as a means of settling disputes between nations.
> 2. To achieve this goal, all States must co-operate to establish an open and substantially disarmed world (a) in which armed forces and armaments will be reduced to such a point and in such a thorough fashion that no State will be in a condition of armed preparedness to start a war, and (b) in which no State will be in a position to undertake preparations for war without other States having knowledge of such preparations long before an offending State could start a war.
> 3. To reach and keep this goal, international agreements must be entered into by which all States would reduce their armed forces to levels, and restrict their armaments to types and quantities, necessary for (a) the maintenance of internal security and (b) fulfillment of obligations of States to maintain peace and security in accordance with the United Nations Charter.
> 4. Such international agreements must ensure by a comprehensive and co-ordinated programme both: (a) the progressive reduction of armed forces and permitted armaments to fixed maximum levels, radically less than present levels and balanced throughout the process of reduction, thereby eliminating mass armies and preventing any disequilibrium of power dangerous to peace; and (b) the elimination of all instruments adaptable to mass destruction.
> 5. Such international agreements must provide effective safeguards to ensure that all phases of the disarmament programme are carried out. In particular, the elimination of atomic weapons must be accomplished by an effective system of international control of atomic energy to ensure that atomic energy is used for peaceful purposes only.
> 6. Such international agreements must provide an effective system of progressive and continuing disclosure and verification of all armed forces and armaments, including atomic, to achieve the open world in which alone there can be effective disarmament.

Minimum Objectives for a Comprehensive Arms-Limitation System

In planning comprehensive arms-limitation systems which fall short of total and complete disarmament, we must nonetheless have ambitious objectives. They should be:

1. to take away from each nation, or any probable coalition of nations, the power to defeat another major nation;

2. in the absence of international guarantees, to retain for each nation a fraction of its original military strength so that the threat of its use is available to deter those few actions by others which would threaten that nation's most vital interests;

3. to reduce the likelihood and danger of war by reducing the pressures toward an arms race, reducing the extent to which quick-reaction forces of great potency are needed, reducing the immediate destruction produceable by a war to the lowest level compatible with the other aims—and by

4. reducing, to whatever extent possible, the total economic and human cost of military power and arms control combined.

IV. POSSIBLE FORMS OF COMPREHENSIVE ARMS-CONTROL SYSTEMS

As previously stated, by comprehensive arms-control systems are meant those systems designed to eliminate or markedly limit the major instruments of war and to provide sufficient inspection and control of production, research and development to prevent the creation of clandestine forces. Such systems may be designed so as to eliminate eventually all military weapons except those required for internal police action, or merely to reduce their numbers to a less dangerous level. During the past decade, several comprehensive arms-control systems have been outlined, some of them by official groups involving NATO and Warsaw bloc members and others by private individuals with an interest in the problem.

The comprehensive systems that have been proposed fall into two categories, those which involve essentially total disarmament and those which only reduce force levels and depend upon inspection systems and whatever inherent stability the system may have to deter the clandestine build-up of additional weapons or the use of the existing forces. Systems of the latter type are known as stable-deterrent systems.

Total disarmament systems also may be divided into two categories, those which assume international military forces and associated legal apparatus, and those which do not.

Essential Features of Comprehensive Arms-Control Systems

Proposals made in the past have many features in common. Many of them still appear to be essential even at this time. The most important of these are:

1. Agreement upon objectives of the system, i.e., the final weapons and manpower composition of the national military establishments and of any international military force that will be created.
2. Agreement to disclose information pertaining to armament stockpiles, armament production, weapons research and development, national budgets, etc., and to permit checking of the veracity of these disclosures.
3. Agreement upon a time schedule for reduction of the national forces' levels and weapons' levels, and of the build-up of the inspection organ and of the international security force if one is to be created.
4. Agreement upon details of the inspection apparatus to monitor critical components of point (2) above and upon the rights of the inspectorate.
5. Agreement on the legal aspects of the control authority.
6. Some description of the course to be followed in the event that violations of the agreement are discovered, or that activities of the inspection organ are impeded.

We will show the essential features of each of the types of comprehensive arms-control systems discussed above and make an effort to compare their relative desirability, considering such factors as ease of implementation, cost, and degree of assurance provided.

V. COMPONENTS OF ARMS-LIMITATION SYSTEMS—INSPECTION AND CONTROL

An essential part of any realistic comprehensive arms-reduction proposal will be the inspection and control system. The effectiveness of the inspection system in providing assurance that agreements are really being respected will not only govern the security provided by the specific arrangement, but will obviously greatly influence the willingness of nations to participate in it. It is also clear that the more extensive, complicated, and costly a proposed inspection system is, the more difficult will be its acceptance and implementation. It is not necessarily true that the more elaborate the inspection system, the greater the confidence it will engender, for this is governed as much by the nature of the specific arms-limitation agreement being monitored as by the actual inspection system. Two examples will illustrate this point.

Relationship between Specific Arms-Limitation Measures and Inspection Requirements

During the 1958 Geneva Conference on Means of Preventing Surprise Attack, the Western delegates proposed a very elaborate and costly system designed to detect and warn of the build-up or actual occurrence of a surprise attack. For a number of reasons the Western proposals did not include any limitation on the number or deployment of the various weapons of mass destruction the system was to control. Though in certain situations this system would provide some additional security against surprise attack, it was very costly for what it would accomplish. In addition, it was possible to imagine situations where it could be exploited by an aggressor. The difficulty with such a system is the necessity of providing continuous observation at many separate places as well as extremely rapid communication and data-processing capability between each of the observation points and national or international decision-making centers. The need for ultra-rapid, extremely reliable communication and data processing is created by the very short time of flight of ballistic missiles. In contrast to these severe requirements, an inspection system designed to monitor complete disarmament, or even the stable deterrent system to be examined later, will have no need for ultra-fast or perfectly reliable electrical communication since nearly all required responses will be measured in days, weeks or months. In addition, to the best of my present ability to estimate, a total disarmament agreement would probably not require a larger inspection force to monitor it than would be required by the proposed system to warn of a surprise attack. These remarks are not meant to imply that there are no useful limited measures which could be undertaken to reduce the dangers of surprise attack which there certainly are, but rather to indicate the difficulty of going very far along this path.

The problems encountered in agreeing upon a system for detecting violations of a nuclear test ban are another illustration of the difficulty of implementing partial measures. At the time of this writing, the extensiveness of an adequate system is the subject of disagreement not only between the United States-United Kingdom delegation and the Soviet Union delegation at Geneva, but between various scientific groups within the United States. The system agreed upon clearly does not have a high probability of detecting small explosions. A considerable increase in the number of stations in the network would be required to improve this situation. The Soviet Union obviously fears such an increase in the number of seismic stations and the concomitant increase in the inspection force, while many people in the United States are equally fearful of clandestine testing within the Soviet Union. Two critical years have been spent attempting to negotiate this issue. Ironically, an inspection system for monitoring a truly comprehensive disarmament agreement would probably have no need at all for a system to detect underground nuclear tests.

With properly planned stable deterrent systems, the more extensive the inspection system is, the lower will be the levels to which forces can be reduced with safety. In an initial phase of disarmament, therefore, it may be easier to reconcile the two fears (the Soviet fear of wide-spread inspection while weapons remain, and the Western fear of clandestine USSR forces) by starting with a stable deterrent system than by attempting to implement one of the total disarmament plans.

Different weapons will pose different inspection requirements. Ships will be easier to control than aircraft, aircraft easier than missiles, etc., and the degree of assurance required in the information concerning different weapons will vary as well. For example, much more precise information will doubtless be needed regarding the number of ballistic missiles (if any) remaining in a country than will be needed concerning the number of fighter aircraft or short-range air defense missiles. All comprehensive arms-limitation systems that are to be examined require some inspection system, but the inspection requirements will differ greatly between the systems.

The *feasibility* of the systems to be studied will depend upon the feasibility of adequate inspection; the relative *desirability* of the different plans will be affected in part by the complexity of the inspection system. Though inspection techniques of arms control are examined thoroughly in Bernard T. Feld's chapter in this issue, a review of pertinent information regarding the inspection systems for use in controlling nuclear weapons and for controlling the principal means of delivering them will be presented here.

Specific Techniques of Control and Inspection

The negotiability of any arms-limitation proposal will be determined, to a considerable degree, by the inspection and control measures it requires. The extent to which the production or deployment of any weapon can be restricted by agreement will be established by the ability of an inspection system to verify the agreement. Furthermore, the difficulty of implementation will be determined by the inspection techniques chosen to monitor the agreements. A highly technical system, requiring the development and production of specialized new equipment such as better seismic detectors for detecting underground explosions or special large radar instruments for detecting missile firings, will take longer to install and have operating than one that depends primarily upon the use of available devices, such as existing photo reconnaissance equipment, or just upon physical inspection by observers. Since a wide variety of inspection systems appears to be possible, it is likely that some of them will be more acceptable than others. Unfortunately, they have not been studied adequately, and are not well understood, so that meaningful comparisons cannot be made between them. The planning of comprehensive arms systems should only be undertaken after the control and inspection problems associated with the individual weapons are understood reasonably well.

Objectives of Inspection. An inspection system must serve two different functions. When the arms-limitation agreements are being implemented it will be necessary to verify military forces. Verification will consist of establishing the veracity of the actual disclosures by on-site inspection, and establishing that all existing military units and equipment were included in the initial disclosure. After the verification of the initial disclosures is completed, it will be necessary to continue search for possible clandestine activities, such as the secret production of nuclear material or the construction of missiles.

The degree of assurance required of the inspection system will depend very much on the nature of the arms-limitation agreement being monitored. For example, a stable deterrent agreement which permits relatively large missile forces to remain in national hands requires less assurance regarding the existence of a small clandestine missile force than an agreement completely outlawing missiles.

Inspection and Observation Techniques. In planning arms-limitation systems, it is desirable to limit the inspection and observation components to those of a strategic nature, i.e., to those depending on information regarding location, number, etc., and to avoid the use of tactical information requiring rapid transmission and quick reaction.

The techniques available fall into two basic categories: aerial (or satellite) inspection and observation; and ground inspection using resident or mobile inspectors.

Aerial Reconnaissance for Search and Verification. Photographic reconnaissance provides one of the most effective means of checking the accuracy of facility disclosures and searching for clandestine military or production installations. With modern photographic equipment, it is possible to identify small objects on the ground even though the camera is at high altitude. Because of its great effectiveness and relatively modest cost, photographic reconnaissance is often proposed as the basic means of verification and search in arms-control systems.

Two quite different capabilities are required for the most effective use of aerial photography for search and verification purposes in an arms-control system. There is need for general high-altitude coverage and for a modest amount of very-high-resolution low-altitude reconnaissance capability to be used for investigating suspicious objects which cannot be identified from the high-altitude films. Though the high-resolution capability is not absolutely required, its existence will greatly reduce the ground inspection effort.

A quite modest flying and photo-interpreter effort appears to be adequate to verify or repudiate the disclosures regarding present-day missile-launching sites, factory and camp locations, etc.

Ground Inspection Techniques. The ground inspection system will be used to fulfill a number of quite separate functions. Principal among these are:

(a) to assist in the effort to detect or verify the existence and location of all significant military weapons, military test facilities, military research establishments and manufacturing facilities with emphasis upon those not amenable to aerial and space techniques,

(b) to investigate areas of suspected military activity uncovered by aerial inspection or by other means,

(c) to maintain surveillance of known facilities capable of developing, testing, or producing military weapons to insure that no illegal activities exist. This could include extensive and continuing inspection of records, raw materials, output, surveillance of personnel, etc., and

(d) to operate technical systems such as surveillance radars, seismic systems, data processing centers, etc., used in conjunction with the inspection operation.

While the functions listed are separate, the inspectorate would no doubt be an integrated system making use of common facilities and staff wherever possible and using the information gained by each of the operations to create as reliable a picture as possible of the military state of affairs. An inspection system adequate to monitor any degree of disarmament appears to be possible, though its acceptability is by no means certain. Detailed discussions of the individual inspection problems are given elsewhere in this issue.

Psychological Inspection. The preceding sections have dealt with the inspection of things. It is also possible to "inspect" people. A variety of means has been proposed for doing this, including newspaper campaigns to familiarize people with the nature of arms-control agreements, offers of rewards, interrogation of key personnel, the use of lie detectors, etc. Though psychological inspection has not been examined carefully, it does appear to be an important inspection technique.

Phasing to Provide Equitable Implementation while Retaining Adequate Security

One of the most difficult problems encountered in the planning of an arms-control system is that of balancing the level of disarmament and the completeness of the inspection system during the period of transition to the final conditions. One means of resolving this difficulty is by combining time-phased arms reductions with an inspection system based upon the concept of territorial disarmament proposed by Louis B. Sohn.[2] In this plan, thorough search for clandestine activities would be permitted in only a fraction of the territory of any one country at the beginning of the implementation period, and the search would progress to the point of complete coverage at the end of the period. The choice of the area to be searched at each stage is selected unpredictably by the inspecting authority and the information gained is combined with the information provided by the initial declarations and by the other inspection techniques. By the proper choice of conditions, it appears that the conflicting interests of the two sides may be made compatible.

International Security Force

A serious point of difference between Western and Eastern proposals for comprehensive arms-control systems is the attitude taken toward the inclusion of some form of international "police force." In recent discussions the Western allies have insisted upon the creation of a modest military force for the international control authority before eliminating national forces, while the Soviet Union and its allies have objected to it.

The Western view has been that, in the absence of an international force, a world disarmed down to the level required for internal security would not be stable because one of the participating nations could decide to violate the agreements and build up a dangerous nuclear force before the others could react and rebuild a nuclear deterrent. The Soviet view has been that it would not be possible to build up a very large clandestine force before the effort would be detected and counter-actions taken. It is also their view that arms-limitation agreements can only work if the large nations believe them to be preferable to an arms race, in which case they will observe the agreements. It is certainly hard to believe that a nation would deliberately eliminate a large share of the military force it has worked hard to create and then take an action that would start a new arms contest.

There are many ways to create an international security force. An attractive way would be to have the smaller nations of the world take on this responsibility with financial and material support from the larger powers. It has even been suggested that France might be willing to join such a group and supply it with a nuclear capability, if it proved desirable to include a nuclear component.

Some Important Inspection Problems

The specific inspection techniques discussed in the preceding sections can be employed singly or in combination to monitor compliance of arms agreements. As already indicated, the intensity of the inspection activities will obviously be controlled by the risk involved if violations are undetected. The most serious inspection problems are posed by the limitation of nuclear weapons and ballistic missiles, and by the need for surveillance of research and development.

The nuclear weapons and missile control problems are interrelated. If one could be absolutely certain of the size of any controlled nuclear stockpile, the need to carry out careful control of missiles would be reduced. Likewise, if very good control could be established over missiles, aircraft, and other carriers of nuclear weapons, less adequate control over the warheads could be accepted. In fact, it will probably be necessary to accept some uncertainty in each and take advantage of the reassurance provided by the overlapping control.

Inspection and Control of Ballistic Missiles. The control and inspection system visualized here is based upon the assumption that at appropriate times, specified in the Arms Control Agreements, complete and accurate information considered necessary for the monitoring of missile limitation agreements will be provided to the control authority by the participants in the agreements. The associated inspection system will have two distinct tasks: it must first verify, within tolerable error, the initial disclosures; and thereafter it must continue to ascertain that existing missile forces are not being augmented clandestinely. Furthermore, it must be so designed that the inspection system need expand only at a rate compatible with the progress being made toward the final armament levels.

The initial verification of missile force level and facilities disclosures can be achieved by direct examination of production facilities and records, and by interrogation of personnel involved in missile production, development and operation. The initial verification would be reinforced by the phased disclosure and verification of missile locations. This step would be accomplished by physical search, using aerial reconnaissance and other techniques in the areas opened to complete inspection. The important property of a good search system for use in verifying missile force disclosures is that it have a high probability of detecting the existence of one, or at most a few, clandestine missiles if a substantial number exist and not that it be able to find all that may exist. This fact has two consequences; it makes possible the use of random sampling techniques and it makes the possession of a sizeable clandestine force very risky.

After the agreed-upon disclosures have been made, the control authority will have the task of authenticating the information disclosed and of insuring its completeness. A variety of complementary techniques are available to verify the completeness of the disclosed data and the continued compliance with the agreements. For these techniques to be effectively employed, the inspection authority must have the right to employ at will those inspection techniques previously agreed upon.

Detailed examination of this problem leads me to believe that it is feasible to create an inspection system in the near future to verify or repudiate good faith with regard to the production and deployment of missiles.

Nuclear Stockpile Control. At the present time the principal technical difficulty encountered in making safe disarmament arrangements stems from the existence of large stockpiles of nuclear materials and the impossibility of determining for sure how large they actually are. This uncertainty in the measurement has been estimated to fall in the range of from 50 to 500 large nuclear weapons if physical means only were employed to estimate past production.

It is probable that an intensive study of the physical means of estimating past nuclear production could greatly reduce this uncertainty. There is also reason to hope that psychological inspection could reduce this number considerably, but it is premature to count on this.

A somewhat easier problem is the limitation of the production of new nuclear material. While it is probable that enough material to make a very few bombs per year could be produced clandestinely or diverted from peaceful uses, I do not believe that this problem is nearly as serious as that of establishing confidence in the location of previously produced material.

Because it is obviously possible for clandestine stockpiles to exist, I feel strongly the need to retain a small nuclear deterrent force at least until considerable confidence has been developed in the inspection system.

Technological Surprise. One of the most difficult military eventualities to prepare for is the technological surprise. In the kind of world we live in, the most effective safeguards from technological surprise are a very broad and intensive research program, as much exchange of scientific and technical information as the cold war permits, and an effective intelligence system.

In a disarmed world there will be no need for secret research and development and it should be strictly forbidden. If all legitimate scientific and technical work is open and observable, the danger of the sudden appearance of unexpected weapons resulting from secret research will be greatly reduced. The techniques of psychological inspection should be particularly useful in dealing with this problem.

It should be noted that after a weapon has been invented, it must not only be developed and tested, but it must also be produced, usually in substantial quantity, before it can be regarded as a serious threat. In an open world large-scale clandestine production and deployment will also be difficult.

One interesting characteristic of highly technical inventions is that such new ideas spring up in many places around the world at more or less the same time, being more dependent upon the sudden development of new scientific knowledge than any other single factor. Because this is so, the danger from technological surprise would be less in a world in which research was conducted openly and results published freely than in the present one.

VI. THE CONCEPT OF STABLE MUTUAL DETERRENCE

The arms-limitation systems examined in Section VIII below propose to achieve security against the disaster of nuclear war by getting rid of nuclear weapons. Stable deterrent systems, on the other hand, attempt to curb the arms race by creating a system in which a surprise attack by one side cannot prevent retaliation by the other and is thus deterred. This is an attempt to follow the course defined by Dr. Leo Szilard as "learning to live with the bomb."[3] While a system of mutual deterrence is less attractive in many ways than properly safeguarded total disarmament, it may be somewhat easier to achieve and could be regarded as a transient phase on the way toward the goal of total disarmament.

The Concept of Mutual Deterrence

The concept of mutual deterrence, explored in considerable detail by a number of military writers, is basically quite simple. Fundamentally it stands upon the premise that it is now possible, or soon will be possible, to create offensive weapons systems sufficiently invulnerable to enemy attack to prevent their destruction by any practicably achievable force. In this circumstance there will be no need to fear an enemy surprise attack undertaken specifically to wipe out the force. If each side has a similarly protected and invulnerable force, there will be no opportunity and therefore no incentive for either to build up a so-called counter-force capability. In this situation, an attack is deterred by the certain knowledge that it will be followed by a devastating reply.

Mutual Deterrence Using Ballistic Missiles

Obviously any of the existing delivery systems can be used as part of a stable deterrent system. Because bomber aircraft normally require large airfields for their operation and appear to be harder to protect than ballistic missiles, missiles are the favorite weapon for planning deterrent systems. Though it may be regarded as a gross oversimplification by the experts, this discussion will ignore the very great complications of the multiple weapon problem and consider the pure ballistic missile case.

In order to destroy missiles installed in protected underground bases and missile systems protected by mobility (Polaris missiles in submarines, or mobile Minuteman missiles, for example), an attacker would be forced to launch many missiles for each one being attacked. It is easy to conceive of situations in which the exchange rate could be ten or greater. If both sides in a military contest develop secure weapons, much of the incentive for an unlimited arms race disappears, even without controls. The ability to achieve relatively secure retaliatory systems makes it appear feasible to control the size of such forces by agreement. To do so requires only strategic inspection techniques, i.e., inspection methods which keep account of force levels rather than of the momentary readiness of forces. There is a minimum size to a deterrent force below which it may not provide security. This is determined by the number of missiles it may be possible to hide without serious danger of detection which obviously will be a function of the effectiveness of the missile inspection system. Herein lies the useful feature of the deterrence concept for the design of an arms-control system; there can be a mutual deterrence system to fit any desired level of inspection and the better the inspection the smaller the deterrent force required to insure stability. This provides a possible means of beginning arms limitations with only a modest inspection effort and a corresponding modest reduction in force, and allowing the system to evolve in the direction of fewer weapons and more inspection as confidence in it is built up.

It is important to note that a missile deterrent system would be unbalanced by the development of a highly effective anti-missile defense system and if it appears possible to develop one, the agreements should explicitly prohibit the development and deployment of such systems.

The possibility of a comprehensive arms-limitation and control system using stable deterrents will be determined to a significant degree by the feasibility of dealing successfully with the ballistic missile-control problem.

It is possible to conceive of a stable deterrent system using only a relatively small number of ballistic missiles and associate with it an inspection and control system adequate to provide a high degree of assurance that there can remain no clandestine force sufficiently strong to be a serious threat to the legal deterrent forces. This can be understood if we examine a simple example. Let us assume that the deterrent force consists of a number of Minuteman missiles installed in underground concrete emplacements. Depending upon the thickness of the concrete protection and other features in the design, the missile can be made secure against shock waves corresponding to overpressures up to about 1000 pounds per square inch, though designs in the region between 100 and 300 psi are considered more practical. A 300 psi overpressure corresponds to the effect of a five-megaton bomb bursting on the ground approximately 0.7 mile from the point of measurement. The overpressure is a very sensitive function of the distance from the explosion, so that if guided missiles are used to deliver nuclear weapons in attacking hardened targets, their accuracy is very important. Missile accuracy is specified by quoting a median accuracy, which is the radius of a circle about the aiming point containing half of the impacts from a repeated series of trials.

If a nuclear weapon had to make impact within one-half mile of a target to destroy it, a missile having a median accuracy of half a mile would have a 0.5 probability of doing so, two missiles would have a 0.75 probability of doing so, three missiles a 0.875 probability and four missiles would have approximately a 0.94 probability of destroying the target. When the number of targets to be attacked is large and the number of survivors that can be tolerated is small, the certainty with which each individual target must be destroyed becomes extreme, and the number of attacking missiles required can become quite large.

This calculation is typical of many in which the methods are simple and obvious, but is one which should be held in considerable suspicion because of the unreliability of the assumptions. In particular, estimates of exchange ratios are very sensitive to estimates of missile accuracy, a bit of information that is very hard to get and dangerous to trust completely, and one that is subject to change as missiles develop. This does not imply that such calculations are not valuable, but rather that judgment and care should be applied when making and using them.

To demonstrate how difficult it is to destroy a hardened missile force, an example will be given. If it is agreed that each side is to have 200 missiles in its deterrent force and if the missiles were protected for 300 pounds/sq. inch overpressure, 1000 missiles having a median accuracy of one mile would be required to have a 0.9 probability of reducing the attacked force to 10 missiles. It obviously would not require a very intensive inspection effort to detect an attempted build-up of this magnitude.

Limitation on Nuclear Weapon Stocks

A more secure system can be made if limitations are placed upon the permissible nuclear weapon stockpile as well as upon the ballistic missile force. By limiting the size of the nuclear weapon stockpile, it is possible to place an additional constraint upon the maximum size of the surprise attack capability which could build up clandestinely. Though it might appear that adequate security could be obtained by effective controls on nuclear stockpiles alone, a system in which several independent controls are imposed upon each of the major weapon systems is obviously more secure.

In order to restrict the size of nuclear stockpiles in a meaningful way from the point of view of deterrent security, it will be necessary to limit the use of nuclear weapons to retaliatory purposes. This is so, for if they were to be permitted for limited war purposes or air defense, the number of weapons, and therefore the amount of fissionable material required, would be so great that large numbers could be diverted to the surprise attack force.

These restrictions do not appear serious. As missiles become the principal weapon for surprise attack, air defense becomes of limited value in actually protecting the country. Furthermore, limited nuclear war appears to be undesirable from a military point of view even in the absence of arms control. In that situation, however, one must be prepared for limited nuclear war, because the other side may introduce nuclear weapons, as pointed out by Henry A. Kissinger in this issue. In the environment of a comprehensive arms-limitation system, on the other hand, it is possible to enforce reliable constraints against arming limited-war forces with nuclear weapons, which obviates this problem. We do not wish to preserve the institution of limited nuclear war.

What Constitutes an Adequate Deterrent? What does it take to deter the launching of a surprise attack? Obviously there is no specific answer to this question. From the Western point of view the question really is, "What does it take to deter the Soviet Union from launching a surprise attack?" This question cannot be answered very satisfactorily; it depends so very much on one's views of the objectives of the Soviet leaders. There are students of Kremlin policy who contend that the Soviet leaders are prepared to sacrifice a third of their inhabitants and most of their cities if by doing so they could achieve world domination. If one accepts this thesis, an extreme one, he must plan a deterrent system capable of inflicting such punishment after he has absorbed an attack; i.e., one large enough to permit one or two hundred missiles to survive after any possible Soviet attack. A more moderate view taken by others, myself included, is that the present Soviet leaders would be unlikely to risk the nuclear destruction of their major cities in the absence of a very serious threat, in which case the deterrent force could be small because in this situation belief that any missiles would survive an attack would provide adequate deterrence. There are valid arguments for making the deterrent force as small as possible in spite of the greater stability and ease of inspection of substantial deterrent forces. They relate to the dangers of accidental war and to the willingness of nonnuclear nations to allow the continued existence of large nuclear ballistic missile forces among other things.

It might be desirable to start with a substantial deterrent force (200-500 missiles) to reduce the danger discussed above, and as experience is gained with the system and confidence is achieved, the deterrent force reduced to a very small size or even eliminated completely.

The Uses of Mutual Deterrence

The importance of a stable deterrent system used as a component of an arms-limitation arrangement is that it provides a means of reducing the danger from clandestine nuclear weapons and long-range delivery vehicles. It may be used in conjunction with any of the comprehensive disarmament systems described in Section VIII below. In this case, instead of completely eliminating nuclear weapons and delivery systems, a small number will be permitted to remain. While this situation is not as desirable as would be the actual elimination of all such weapons, it must certainly be preferred to the present unlimited arms race and actual elimination probably cannot be achieved. If a system of stable deterrents can be used to establish a condition of military security during which military forces and weapons stockpiles can be cut back, international tensions reduced, and a period of cooperation and mutual confidence achieved, total nuclear disarmament with or without an international security force may be much more easily agreed upon.

VII. A COMPREHENSIVE DISARMAMENT SYSTEM BASED UPON STABLE DETERRENCE

In Section V it was shown that a mutually agreed-upon stable deterrent system could provide the basis for comprehensive disarmament because it provided a means of reconciling the Soviet reluctance to permit inspection and the Western fear of clandestine weapons. The size of the deterrent force can be chosen large enough to provide adequate security with minimal inspection and subsequently reduced as the inspection effort grows and experience establishes confidence in it.

Nuclear deterrence, using aircraft and missile-delivery systems, provides the basis of military security for both the United States and the Soviet Union at the present time, so that one could contend that we are just proposing to endorse the present situation. However, the proposal for a stable deterrent system is an attempt first to end the nuclear race by imposing a limit upon the size of the legal deterrent, and then to carry out extensive disarmament under the security umbrella which it provides.

As has been stated many times, the ultimate objective of an arms-control system should be to achieve arms reductions to the levels required for internal police action, but, like most other Americans who have examined this problem, I believe that this condition can be achieved only if an adequate international security force exists, controlled by an adequate system of law, or alternatively, if the international tensions can be greatly reduced before disarmament to that level is undertaken. The attainment of either of these goals in a single step appears to be extremely ambitious and therefore it appears desirable to proceed toward this utopian goal in smaller steps. One method of doing this is described in the next section.

Phases in the Development of the Stable Deterrent Disarmament System

In selecting this particular system, I have consciously attempted to limit the amount of inspection needed during the early period of implementation in order to meet Soviet fears. I believe that the arrangement will provide adequate security for the West. The following four phases are included in this plan: preparatory phase, implementation phase, build-up of International Authority, and the final elimination of national forces.

Phase I: Preparatory Period. During this period the details of phase II would be worked out and agreed upon. Among those things which would have to be settled would be:

(a) The size of the deterrent force, its composition, etc.

(b) The size and composition of nonnuclear forces for limited war to remain at the end of phase II; this will involve agreements covering both land and sea forces.

(c) Agreements to halt or limit development and production of new weapons.

(d) A timetable for reaching the agreed upon levels of armament and troops.

(e) Agreement upon an inspection agency to monitor the agreements and upon a timetable for its implementation. The implementation will involve geographic phasing as well as time-phasing so that the proportion of military facilities exposed to inspection can be made to correspond to the amount of disarmament that has taken place.

(f) Agreements upon steps to be taken in the advent of violations.

(g) Methods of adjusting forces and inspection within the framework of the treaty.

In this paper I deliberately avoid making firm proposals for force levels because they should result from a detailed study. However, to provide some sense of what is visualized, a possible range will be indicated.

The initial deterrent force could consist of a force in the range of from 100 to 400 large nuclear weapons and accompanying delivery vehicles, either aircraft or missiles. Studies made independently by the United States Army and Navy have indicated that, even in the absence of agreements limiting force size and permitting inspection, 200 relatively secure missiles would provide an adequate deterrent. As the inspection system is put into operation and confidence is gained in it, the number of nuclear weapons can be reduced markedly below that required initially.

Conventional force levels can correspond to those in the USSR and Anglo-French proposals in which manpower was limited to the range of 1-1.5 million men for the United States, the Soviet Union, and China, somewhat lower limits for France and the United Kingdom, and can eventually be reduced to much lower levels. These numbers are not based upon adequate examination and may be altered considerably by further study. In addition to limiting total manpower, it is important to limit the amount of armaments allowed to remain in national arsenals. Careful consideration must also be given to the problem presented by the United States requirement for naval support and overseas transport as long as substantial conventional forces are permitted to exist.

Phase II: Implementation Period. During this period, which might be as short as three years, the agreements reached in the previous phase would be carried out. The steps would include the following:

(a) The submission of previously agreed-upon information concerning military units, size of weapons stockpiles, information pertaining to production facilities, development establishments, test sites, etc. In some cases the information will be made available at the beginning of the implementation period, in other cases the disclosure of information may be made available according to a previously agreed upon schedule.

(b) The elimination of surplus weapons. According to an agreed upon schedule nuclear weapons, missiles, tanks, aircraft and all other weapons included in the agreement will be placed in depots under international supervision or destroyed. In the early stages of the agreement it may appear prudent to leave the weapons in a supervised depot so that they may be turned back to their owners if subsequent agreements are not carried through. Later, when the good faith of all of the participants is fully accepted, these surplus weapons should be destroyed. In the beginning the transfers of weapons to international control will be checked against the declarations made by each nation. As inspection activities are established, the initial declarations will also be checked.

(c) The build-up of inspection. In parallel with the reduction of arms, inspection activities should be started according to the agreed upon schedule. The first inspection activity will be to verify arms declarations and to ascertain that arms production and development have stopped. A second responsibility of the inspection authority will be to establish that clandestine activities do not exist.

The precise nature of the inspection force is a matter to be worked out between parties to the agreement. As stated in Section V above, a large variety of inspection systems and modes of implementation appears to be feasible from the point of view of security; the deterrent force being used to compensate for any lingering uncertainty about the effectiveness of inspection during the build-up period.

Phase III: Consolidation of the Accomplishments of Phase II and Build-up of an International Authority. At the end of Phase II the military forces of the individual nations will have been reduced to the agreed-upon levels and the inspection system will have been sufficiently exercised to make possible a dependable estimate of its capabilities. At that time it will probably be possible to further reduce the deterrent force. The principal innovation to be made in this period will be the creation of a modest international security force and the legal authority to operate it. (See Arthur Larson's paper in this issue.) As experience is gained, the international authority can be increased in size and authority until the point is reached where there is sufficient confidence in it to give it the task of maintaining the peace. At that time the last stage in the creation of a world security system can be undertaken—i.e., Phase IV, the complete elimination of all military capability not required for internal security.

VIII. A SURVEY OF SOME PREVIOUS COMPREHENSIVE DISARMAMENT PROPOSALS

During the meetings of the United Nations Disarmament Sub-Committee in the years 1954 and 1955, both the East and the West made formal proposals for comphrehensive disarmament systems. As might be expected, in their initial form each of them was one-sided and disregarded the known security worries of the other side. During the course of the Sub-Committee meetings, each side modified its proposal in an attempt to make it more attractive to the other. In spite of the fact that both sides modified their initial positions greatly, they were not able to reach agreement. Subsequently, the USSR has made additional proposals worthy of examination. It is informative to examine the past efforts to see whether or not they appear to be adequate from a security point of view and, if not, how they would have to be modified to make them satisfactory.

The following summary (taken from the book *The Arms Race* by Philip Noel-Baker[4]) shows how far the participants in the United Nations Sub-Committee discussions were able to progress before their work was halted.

Anglo-French Proposal, 11 June 1954—Modified 19 April 1955

The Draft Disarmament Treaty . . . should include provisions covering the following:

(1) The total prohibition of the use and manufacture of nuclear weapons and weapons of mass destruction of every type, together with the conversion of existing stocks of nuclear weapons for peaceful purposes.

(2) Major reductions in all armed forces and conventional armaments.

(3) The establishment of a control organ with rights and powers and functions adequate to guarantee the effective observance of the agreed prohibitions and reductions.

The agreement to start with a reduction of conventional forces to a ceiling of 1-1.5 million men. A nuclear production cut-off to begin when 50 percent of the conventional force reduction has been made. After 75 percent of conventional force reduction has been made:

(1) There should be "a complete ban on the use of atomic, hydrogen and other weapons of mass destruction."

(2) Simultaneously, the elimination of these weapons and the final quarter of the agreed reduction in armed forces and conventional armaments shall begin and both processes shall be completed within the time limit laid down in the Disarmament Treaty.

All atomic materials shall then be used only for peaceful purposes.

According to the British and French delegates, this proposal was dependent upon agreement upon: "1. Agreed-upon reduction in the levels of conventional forces [ceilings of 1-1.5 million men for United States, Russia and China and 650,000 each for Britain and France]. 2. The institution of an effective control system that would operate throughout the whole disarmament program."

Proposed Control Mechanism. The Anglo-French Memorandum made the following statement concerning the control problem:

> I. In our view the control organ must have the right of full information and inspection of the following "objects of control" . . .
>
> (1) numbers of armed forces and their equipment;
>
> (2) conventional land, sea and air armaments, including certain categories of civilian aircraft and shipping;
>
> (3) military installations, including barracks, ordinance depots, dockyards and airfields;
>
> (4) factories capable of making armaments (including aircraft), explosives, and propellants;
>
> (5) nuclear installations and reactors;
>
> (6) plants capable of making chemical and biological weapons.
>
> II. The control organ should be able to make use of the following methods of inspection and supervision: (1) aerial reconnaissance; (2) inspection on the ground; (3) budgetary controls; (4) observation at strategic points.
>
> III. The control organ should also have the following rights:
>
> (1) unrestricted rights of freedom of movement to, from and within all States party to the treaty;
>
> (2) the right to make full use of the communication systems of the State which it is inspecting and to possess suitable transport and communications of its own;
>
> (3) the right of access to all the objects which I have just mentioned; advance notice would be given of routine visits, but the right of inspection without warning would also be essential;
>
> (4) the right to investigate alleged or suspected breaches of the treaty in any establishment or installation in the territory of any State party to the treaty; and, perhaps, in some respects, the most important of all,
>
> (5) the right to use all necessary technical devices which may assist supervision and detection.

USSR Proposal, 10 May 1955, and Amplified in 1957

1. the manpower ceilings of between 1 and 1.5 million, etc.;
2. "the 5 Powers shall undertake also to reduce their conventional armaments correspondingly";
3. the 50 percent arrangement for the "cut-off";

4. the 75 percent arrangement for the abolition of stocks of nuclear and other mass-destruction weapons;

5. "appropriations by States for armed forces and conventional armaments shall be reduced correspondingly";

6. there should be *one* "International Control Organ," with expanding powers;

7. the International Control Organ should:

(a) have "staff . . . selected on an international basis";

(b) enjoy the right "to require from States any necessary information on the execution of measures for the reduction of armaments and armed forces";

(c) "have *permanently in all States signatories . . . its own staff of inspectors having, within the bounds of the control functions they exercise, unimpeded access at all times to all objects of control*";

(d) "have unimpeded access to records relating to the budgetary appropriation of States for military needs";

(e) have *"rights and powers to exercise control, including inspection on a continuing basis, to the extent necessary to ensure implementation of the above-mentioned Convention by all States. . . ."*

On the completion of all the measures enumerated above, it would be desirable that the Powers should further reduce their armaments and armed forces to the levels strictly necessary for the maintenance of internal security and the fulfillment of the UN Charter.

To this program was added in 1957 "the total abolition of all missiles, both intercontinental missiles and intermediate and short-range missiles as well."

Control Mechanisms for Conventional Armaments as Proposed in March 1956.

With a view to the establishment of effective international control over the fulfillment by States of the above-mentioned obligations with respect to the reduction of conventional armaments and armed forces, an international control organ shall be established having the following rights and powers:

1. [This deals with surprise attack and the establishment of ground control posts.]

2. The international control organ shall exercise control, including inspection on a permanent basis, to the extent necessary to ensure implementation of the agreement by all States.

3. The control organ shall have permanently in all States party to the agreement its own staff of inspectors, recruited on an international basis, having, within the bounds of the control functions which they exercise, unimpeded access at all times to all objects of control.

The objects of control are: military units; stores of military equipment and ammunition; land, naval and air bases; factories manufacturing conventional armaments and ammunition.

4. At a specified stage of the execution of the general disarmament program, when confidence among States had been strengthened, the countries convened shall consider the possibility of using aerial photography as one of the methods of control.

5. The control organ shall have unimpeded access to records relating to the budgetary appropriations of States for military needs, including all decisions of the legislative and executive organs on the subject.

6. The control organ shall establish in the capitals of States party to the agreement branches whose functions shall include maintaining liaison with the governmental organs of States, directing the work of the control posts and inspectors operating in the territory of the State concerned, and analyzing the information furnished by States.

7. The international control organ shall be established within the two months following the entry into force of the agreement. It shall establish its local branches, set up the control posts and position its inspectors in good time to ensure that they are able to begin carrying out their functions at the moment when States begin the execution of the measures provided for in the agreement.

8. The international control organ shall make recommendations to the Security Council on measures of prevention and suppression with regard to violators of the agreement on the reduction of conventional armaments and armed forces.

9. The States party to the agreement shall submit to the international control organ within one month after its establishment complete official figures of their armed forces, conventional armaments and expenditures for military requirements.

Comparison of the Russian and Anglo-French Proposals

Both proposals were so general that it is not possible to judge their adequacy. Whether or not either proposal would be acceptable to the nations who must participate in its implementation would be determined by the details of inspection and the details of scheduling or timing. The experience with the nuclear test ban negotiations would lead one to believe that getting agreement on the details on either of these two similar proposals would not have been easy. Note that there were many points of agreement in the two proposals and either could easily have served as a basis for the design of an adequate arms-control system if the desire to create one had been great enough to overcome the effects of fear, skepticism and suspicion regarding each other's motives which seem to have governed United States and Russian actions at that time. Both proposals included measures to cope with the major problems of that period:

1. Both proposed the elimination of nuclear weapons production.

2. Both proposed the ultimate elimination of nuclear weapons and other weapons of mass destruction.

3. Both included a provision for the reduction of manpower in the military forces and limiting the conventional armament.

4. Both provided for an international inspection and control authority.

5. Both suggested a timetable for implementing of the systems, but both proposals were very vague.

It is also interesting to note that in 1955 neither side felt it necessary to eliminate nuclear delivery means—then the long-range bomber—though in 1957 the Soviet Union did hold out the prospect of eliminating missiles. Nor did either side propose the creation of an international security force to provide a means of enforcing compliance of the agreements.

These omissions probably indicate that in 1955 there was not yet sufficient appreciation of the fact that it was no longer possible to verify completely declarations concerning the size of nuclear stockpiles and that consequently small clandestine stockpiles might exist after completing the elimination of declared stockpiles.

The Western proposals were withdrawn in 1955, as Mr. Frye has already stated in this issue, because of a growing fear on the part of some American experts that the problem of the clandestine nuclear stockpile could not be solved. In retrospect, it is a great tragedy that agreements were not reached and implemented in the period 1955-1957 before the development of the ballistic missile and lightweight thermonuclear weapons that have made the problem of inspection even more difficult than it was then.

Both proposals call for the ultimate elimination of nuclear weapons and other weapons of mass destruction, elimination of nuclear weapon production, and a major reduction in the size of conventional military forces and military armaments available in each country. If adequate controls on long-range aircraft and ballistic missiles were added to the preceding proposals, they would be applicable to the situation existing today.

We still face the question of clandestine armaments, especially clandestine nuclear weapons and clandestine ballistic missiles, but a solution of this problem appears to be possible if both sides really want it. Among the various means of minimizing the danger of clandestine weapons are the creation of an international security force sufficiently strong and dispersed to be an adequate counterthreat to any likely clandestine force, the creation of a sufficiently effective inspection system to make the retention or creation of a clandestine force extremely difficult, and the maintenance of nuclear weapons depots under international supervision to be available to their owners in the advent of the sudden appearance of such weapons in the hands of any other nation or group of nations.

The USSR Proposal for General and Complete Disarmament

On 19 September 1959, following an address to the United Nations Assembly by the Chairman of the Council of Ministers of the USSR, Mr. Gromyko submitted a memorandum outlining a program for what he termed "general and complete disarmament." Mr. Gromyko's memorandum called the Russian proposal "a new way of solving the problem of the arms race," which he characterized as "the burning problem of our time." The proposed program is indeed more imaginative than any proposed by responsible leaders of a major nation in the postwar period. Though it spells out very lofty goals, it is very general in nature and consequently leaves much to both the imagination and to future negotiations. Mr. Gromyko[4] gave the following information concerning the new proposal for "General and Complete Disarmament":

The USSR Program for General and Complete Disarmament

A program for general and complete disarmament must include the following measures:

The disbanding of all armed forces (land, naval and air forces) and the prohibition of their re-establishment in any form;

The destruction of all forms of armaments and military supplies both in the possession of the armed forces and in depots;

The elimination of all warships, military aircraft, and all other types of military equipment;

The complete prohibition of atomic and hydrogen weapons, the cessation of the manufacture of all types of these weapons, their elimination from the armaments of States and the destruction of stockpiles;

The complete cessation of the manufacture, and the destruction of all types of war missiles, irrespective of their range, including military space vehicles;

The prohibition of the production, possession and storage of the means of chemical and bacteriological warfare, and destruction of stockpiles of these types of weapons;

The abolition of military bases of all kinds—army, navy, and air force—in the territories of foreign States and all missile-launching installations;

The cessation of military production at war plants and at war production units in general industrial plants;

The termination of all military courses and training, both in the army and in public organizations, and the enactment of legislation abolishing military service in all its forms—compulsory, voluntary, by recruitment, and so forth;

The abolition of war ministries, general staffs, military educational institutions and military and paramilitary establishments and organizations of all kinds;

The discontinuance of the appropriation of funds for military purposes in any form, whether from State budgets or from public organizations and private individuals;

The prohibition by law of war propaganda and the military education of young people, and the enactment of legislation prescribing severe penalties for the infringement of any of the measures enumerated above.

States shall retain at their disposal only strictly limited contingents of police (militia), the size of which shall be agreed upon for each country and which shall be equipped with small arms and be used exclusively for the maintenance of internal order and the protection of the personal security of citizens.

For the purpose of supervising the timely implementation of the measures of general and complete disarmament, an international control organ composed of all States shall be established. The staff of the control organ shall be recruited on an international basis with due regard to the principle of equitable geographic distribution.

The international control organ shall have at its disposal all the facilities necessary for the exercise of strict control. The functions and powers of this organ shall correspond to the nature of the disarmament measures being implemented.

The Soviet government proposes that the program of general and complete disarmament should be carried out within as short a time limit as possible—within a period of four years.

The following measures are proposed for the first stage:

The reduction, under appropriate control, of the strength of the armed forces of the Union of Soviet Socialist Republics, the United States of America and the People's Republic of China to the level of 1.7 million men, and of those of the United Kingdom and France to the level of 650,000 men;

The reduction of the strength of the armed forces of other States to levels to be agreed upon at a special session of the United Nations General Assembly or at a world conference on general and complete disarmament;

The reduction of the armaments and military equipment at the disposal of the armed forces of States to the extent necessary to ensure that the remaining quantity of armaments corresponds to the level fixed for the armed forces.

The following is proposed for the second stage:

The completion of the disbanding of the armed forces retained by States.

The elimination of all military bases in the territories of foreign States; troops and military personnel shall be withdrawn from the territories of foreign States to within their own national frontiers and shall be disbanded.

The following is proposed for the third stage:

The destruction of all types of nuclear weapons and missiles; the destruction of air force equipment; the entry into force of the prohibition on the production, possession and storage of means of chemical and bacteriological warfare. All stockpiles of chemical and bacteriological weapons in the possession of States shall be removed and destroyed under international supervision;

Scientific research for military purposes and the development of weapons and military equipment shall be prohibited;

War ministries, general staffs and all military and paramilitary establishments and organizations shall be abolished;

All military courses and training shall be terminated. States shall prohibit by law the military education of young people.

In accordance with their respective constitutional procedures, States shall enact legislation abolishing military service in all its forms—compulsory, voluntary, by recruitment, and so forth, and prohibiting the re-establishment in overt or covert form of any military or paramilitary establishments and organizations.

The appropriation of funds for military purposes in any form, whether from State budgets or from public organizations, shall be discontinued. The funds made available as a result of the implementation of general and complete disarmament shall be used to reduce or abolish taxation of the population, to subsidize national economies and to furnish extensive economic and technical assistance to underdeveloped countries.

For the purpose of supervising the implementation of the measures of general and complete disarmament, an international control organ shall be established. The extent of the control and inspection exercised shall correspond to the stage reached in the phased disarmament of States.

Upon the completion of general and complete disarmament, which shall include the disbandment of all services of the armed forces and the destruction of all types of weapons, including weapons of mass destruction (nuclear, rocket, chemical, bacteriological), the international control organ shall have free access to all objects of control.

The control organization may institute a system of aerial observation and aerial photography over the territories of States.

While the program of general and complete disarmament is being carried into effect and until the final disbandment of all armed forces, States shall maintain the same ratio among the various services of their armed forces as existed at the time of the entry into force of the disarmament agreement.

The program of general and complete disarmament shall be carried out by States in strict conformity with the time-limit specified in the agreement, and its implementation may not be suspended or be made contingent upon the fulfillment of any conditions not provided for in the agreement.

To anticipate possible attempts on the part of States to circumvent or violate the agreement on general and complete disarmament, the agreement shall contain a provision stipulating that any question of its violation shall be submitted for immediate consideration by the Security Council or the General Assembly of the United Nations, in accordance with their respective sphere of competence.

Is it real? The Western reaction to this proposal ranged all the way from one of sarcasm and ridicule to the observation that "it offered nothing new." It was pointed out that the system did not provide for adequate inspection or control measures. The USSR paper does, however, recognize the need for inspection and control, though it seems to permit adequate inspection only after very extensive disarmament has taken place. This is clearly unacceptable to the West, but I believe that it would be possible to get East-West agreements upon an inspection system if there was agreement upon the goal of complete and total disarmament. The detailed specification of an inspection system and of a timetable relating inspection and disarmament steps would have to be worked out in negotiation. The USSR proposal makes no provision for an international security force which the Western powers would require. In spite of these criticisms, it is wrong to condemn the proposal as mere propaganda. First, until the details are made clear, it cannot be judged. Second, as pointed out previously, the USSR has never insisted upon as thorough safeguards as the West. Furthermore, it fears any international security force which would be controlled by the United Nations, consequently the plan outlined by Mr. Gromyko may more nearly satisfy their security needs than one involving much more control. To be sure, it seems to ignore some of the most serious fears of the West, and the burden of proof must lie with the Soviet delegation who made the proposal. Nevertheless, since it has not been studied adequately, we do not know what changes would be required to make it acceptable to us nor do we know the acceptability of those changes to the USSR.

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SAVILLE R. DAVIS

Recent Policy Making in the United States Government

There is little use in reviewing the experience of arms-control efforts before the nuclear age, except to contrast it with the present. Apart from the simple longing of mankind for release from war, which is an honorable attitude in any age, the chief carry-over from the prenuclear period has been a negative one. In the 1920's there was a hopeful but ill-fated experiment in partial disarmament which was based on a premise that later proved fallacious and a technique that proved irresponsible.

It was thought at the time that war was caused in good part by efforts of the arms merchants to improve their market. Limit the market, it was argued, and reduce the incentive to war. The resulting attempt to disarm was undermined by cheating in the 1920's because there was no system of policing through inspection. Disarmament was then modified in principle during the 1930's, when the Axis powers showed that there were other causes of war than the greed of the Zaharoffs. It became obsolete after World War II, when the rebuilding of armed force became the order of the day, and the West braced itself for the task of denying to Stalin the easy aggressions which it permitted to Hitler. It is possible that the concept was graded down further than it deserved, considering the size of the arms lobby in the United States today.

In any event, as the naïve type of unsafeguarded arms control of the 1920's became clearly inappropriate to the problems of the next

All quotations in this article are from newspaper clipping files of *The New York Times, The Washington Post,* and *The Christian Science Monitor,* except the comment by a "supporter of the Killian group" (p. 963), which is from a private source.

three decades, there developed a relatively harmless tradition in politics of paying it lip service, so as not to offend the gentler elements of public opinion, and of ignoring it in practice. This tradition of the white lie carried over into the nuclear age, when the need for arms control revived and caused great havoc before it was exposed. For in the mid-fifties the nuclear arms race began in earnest, and the need to check it began to override the incessant struggle to build a better deterrent. For several critical years the habit of pretending to work for disarmament served to mask the fact that the political leadership of the United States did not want disarmament. More specifically, those in Washington who considered arms control undesirable or impractical clearly had the upper hand in the process of making and administering policy, with the help of others who thought the Russians would never sign anyway, or would sign and cheat.

President Eisenhower's first term and the opening year of his second must be understood in terms of this gulf between official speech and action. This was the period when the military high command and the officials in charge of making nuclear weapons were confident that they possessed, and could sustain, a decisive advantage over the Soviet Union in nuclear arms.

History may say that the time for serious negotiation with the Soviet Union had not yet come. As long as the United States was clearly stronger, the Kremlin would come off second best in any negotiation. Moscow was not likely to make an unfavorable agreement at a time when it was confident of catching up and conceivably surpassing the United States within a short time.

The central figures in the drama which then unfolded were the President himself and Secretary Dulles. The close relation between the two is well understood, but the arms-control story shows a particular aspect of it. The President had certain basic concepts which he himself developed and supported as if they were tenets of his administration. One of these tenets advocated arms control, if it could be worked out with safeguards against cheating. His strong sense of direction in this respect came partly from his personal determination to rise above the narrowly military background which he brought to the White House and his desire to be a civilian president, responsive to the highest political, rather than military, values and aspirations. He also was convinced that safeguarded arms control made military sense. From the period of his first Colorado vacation, when he thought deeply about nuclear weapons off by himself in the mountains by the trout streams, he was convinced that "there is no longer any alternative to peace," as he told a State Department audience on his return. When Mr. Eisenhower develops a fundamental conviction like this, he gives it regular support on the highest policy level. He was to rule repeatedly (and still does) in favor of the State Department and against the Pentagon and Atomic Energy Commission when key disputes on arms-control negotiation were referred to him for decision.

Why, then, did his strong general support for this cause result in policies which looked like the reverse, when they were put into action?

This was the role of Secretary Dulles. Mr. Dulles, unlike the President, was an intensely complex individual. Although the President tended to reduce an issue to some fundamental line of reasoning or to a few basic facts from which he could draw a decision, Mr. Dulles enjoyed the stimulus of an intricate situation. As a passionate student of the many contradictions which are built into a nation's foreign policy and into its domestic formulation, his mind was entirely at home in situations in which he had to say one thing one day and another the next, or to talk oppositely to groups with opposing interests. He kept his counsel for the most part as to whether his particular object at a given time was to confuse or disarm his critics, deal with pressing day-to-day situations with realism, or fit his apparent contradictions into some larger plan.

It was not out of character, then, for him to respect the President's deep desire to keep nuclear arms under control, and at the same time to see the many obstacles more clearly than the President, and to think in his own mind that arms control was probably a hopeless exercise for the present. Since the President let himself be guided by Mr. Dulles in day-to-day actions, it was natural that, while the President proposed optimistically, Mr. Dulles disposed skeptically, and with the President's own agreement.

There are subtle degrees of difference here which need to be defined with some care. It is not enough to say, as Walter Lippmann, Marquis Childs, Chalmers Roberts and others have said, that the President's wishes were sabotaged on lower echelons. Mr. Dulles was in charge. The "lower echelons" did his bidding. Many lesser officials in the State Department itself believed in the possibility of arms control more than he did. While the final effect of the Dulles realism on the President's wish and faith was to frustrate them, the relation between the two men was honorable and close, and there was more to it than what looks like a simple betrayal of his chief on Mr. Dulles' part. Had it been merely that, the Dulles strategem would not have worked.

The Russians gave Mr. Dulles continual and abundant opportunities to persuade the President that they did not mean business at almost any stage of a disarmament negotiation. Dulles could count on this kind of negative cooperation from Moscow to buttress his own stern and disciplinary concept of how to face down the Communist threat.

Mr. Dulles was in his element during this period. This writer knew him well when covering the earlier postwar conferences with the Russians, and watched him become the acknowledged master of cold-war maneuver. His legal mind took keen and relentless delight in the business of checkmating his opponent. Furthermore, if anyone else knew how to moderate or shortcut this quarrelsome bargaining procedure, he did not come forward. Democrats and Republicans, liberals and conservatives, genial negotiators and those born tough—all tried, and the results were approximately the same.

It was not argued seriously in Washington that the cold war could be brought to an end. Or even that the beginning of the end was in sight. It is a false dilemma to say that the cold war must be abandoned or continued. The advocates of arms control wanted to introduce one element of stability into the content, at a point where the high pressures inherent in a policy of deterrence might explode. It was assumed that we would seek to manage a two-level policy, with calculated disagreement over most of the range of our relation with the Communist governments, and a few areas where a common interest in survival demanded mutual concessions.

It is now possible to explain what happened in Washington when the course of international strategy reached a turning point. The mutual belligerence of policy between the United States and the USSR, which had served a national aim on both sides, found itself surrounded by new conditions in which it was causing a drift toward severe instability and the danger of nuclear war. What could be done?

A good time to pick up the story is the spring of 1957, when a United Nations conference on disarmament was scheduled at London, when nuclear testing was in full swing, intercontinental missiles seemed uncomfortably close, and the President had chosen Harold Stassen as his Special Assistant on Disarmament. The President wanted to make a fresh effort to negotiate. Mr. Dulles considered that this was the thing to do, but offered the President no hope that it would be successful. The chief opponents of any agreement—Admiral Arthur W. Radford, chairman of the Joint Chiefs of Staff, and Rear Admiral Lewis L. Strauss, chairman of the Atomic Energy Commission—were not greatly perturbed, because Mr. Dulles seemed mainly on their side. Then the unexpected happened.

Stassen became keenly interested in arms control.

His motive is of less importance than its result. He doubtless wanted his mission to succeed. It might have given his political career a fresh start. And, the more he studied arms control, the more he was impressed with its merit. In any event, he violated the tacit gentleman's agreement not to try too hard.

The Stassen episode should go down as a classic in the politics of arms limitation. It got under way in April and May, with Dulles saying, "We consider that control and reduction of arms are possible, desirable, and in the last reckoning indispensable." The President said he felt the Russians were "taking a different tone," because they were "feeling the pinch of building, supporting and maintaining those tremendous military organizations."

At the end of May, Stuart Alsop described a "bitter internal struggle" which took place when Stassen returned from London for consultation. Admiral Radford was the most vocal opponent. "It is not generally known," said Alsop, "how fierce and uncompromising Radford's opposition was, nor how powerfully he was supported. Radford used every conceivable argument against agreeing to mutual inspection in any form." Dulles "adopted a position of cautiously benevolent neutrality."

Radford said publicly to newsmen, "We cannot trust the Russians on a disarmament agreement or anything. They have broken their word too many times."

The President let it be known that he was nettled by the Radford statement, ruled in general terms for Stassen after a series of meetings on lower levels, and told his press conference, "The United States must be ready to meet the USSR halfway on a first step disarmament agreement." This country is not "recalcitrant or picayunish" and should have an "open mind," the President said. Americans must "keep exploring every facet of this whole great field, to see if something can't be done. It just has to be done in the interest of the United States." Stassen went back to London.

Lippmann wrote, "For the first time in the long history of talking about disarmament, we are in sight of a negotiation." The Russians, he said, were "behaving seriously," and the President "decided the costs of not negotiating are greater."

It was almost immediately clear that the result of the policy battle in Washington had been to put Stassen in an even tighter harness of day-to-day instructions from Washington and to embolden him to the point of an indiscretion which enabled Dulles to pull sharply on the checkrein. This was a reckless action on Stassen's part, one that went beyond his instructions: on 31 May an uncleared memorandum was delivered to Soviet chief delegate Valerian Zorin. The risk to Stassen from this action was wholly disproportionate to any possible gain for his cause. An unnamed Washington official told the press that Stassen had been "naïve," which was true, and Dulles announced that Stassen had been rebuked with the President's approval.

To repeat: "with the President's approval."

Lippmann said Stassen's mandate was still "thin, weak and tentative." Chalmers Roberts of the Washington *Post* said this was "a story of how Stassen has been undercut at home . . . by others in the administration, once it appeared the Kremlin might really be serious in an arms agreement." Marquis Childs wrote that the President, "while helping to create a climate of American opinion in which negotiation is possible, has yet to give Stassen the kind of backing necessary in the crucial weeks ahead. The President can do that only by making it clear to Messrs. Radford, Strauss and Co. that they cannot cut the guts from American proposals while pledging fealty to the principle of agreement itself."

"More serious," said Roberts, "the United States is in the position of having reneged on disarmament proposals. . . ." Another Roberts dispatch said that the effect of the Administration debate "is to cast in doubt the nation's good faith in the London disarmament talks." Soviet Foreign Minister Andrei Gromyko in Moscow took advantage of the situation to tell a press conference that the United States was using the London talks as a "screen to continue and intensify the arms race." It is probable that he was making the usual propaganda point. It is not inconceivable, however, that his colleagues had begun to be seriously interested in attempting to negotiate and now concluded that the United States did not mean business.

Late in June, Admiral Strauss took physicists Edward Teller and Earnest O. Lawrence to the White House to argue for continued nuclear testing in order to perfect "clean" weapons. The President was impressed. "But for the moment," he said publicly in noticeably less vigorous terms than before, "it would appear that the psychological factors and the fears of the world are such that we should go ahead with the plan" to offer a conditional suspension of tests.

During the summer Dulles tied the American test-ban offer to an entire package of proposals—a maneuver not unlike the frequent tactic of the Russians of linking a reasonable offer to more radical steps the other side would surely not accept. Stuart Alsop wrote, "The President has hobbled Stassen. Radford and Strauss have won a signal and probably final victory. The President placed conditions on suspension of tests which hardly anyone expects the Soviets will accept."

Mr. Dulles ignored the charge. "This can be said with assurance," he said, like an ardent advocate of arms control, "the risks of seeking to move forward are far less than the risks of being frightened into immobility." Having won his point, he was taking steps as he so often did to conceal his victory by talking as if he leaned generously the other way. "We must assume that since an agreement is necessary, it is possible and that we must make it possible," he declared.

In September the chapter was closed. The AEC announced new tests at Eniwetok. Henry Cabot Lodge told a private group at the United Nations that the test-ban proposal should be unhooked from the rest of the package offer if negotiations were to get anywhere. Stassen told two officials in Washington, according to Childs:

> If you deliberately want to prevent achieving any disarmament, then you do the following:
>
> 1. You make your proposals so complicated and far-reaching that the other side is almost certain to reject them.
>
> 2. You impose on the negotiator the necessity to check and recheck and check again with officials back home before he can advance another step in the negotiations. In other words, you make it as difficult as possible to carry on a frank face-to-face discussion on the terms of a disarmament agreement.
>
> 3. You tolerate—if you do not actively encourage—officials who say publicly that there is no possibility of getting a disarmament agreement and that an agreement would, in any event, be unworkable if not desirable.

Lippmann had said a little earlier: "The great underlying issue which in the end must be decided by public debate, has been debated in secret within the administration and has been decided but not settled." This issue was: "Whether, if an enforceable agreement to limit armaments could be reached, it would be wise to make the agreement."

On 4 October 1957 Sputnik went up. Four weeks later the President brought President James R. Killian, Jr., of the Massachusetts Institute of Technology, to the White House with authority to bring the best available talent into the President's scientific advisory committee. A new weight was added to the balance. By May 1958, six months later, the balance had tilted to the opposite side. It is an oversimplification, but a useful one, to say that the President now listened primarily to men whose information and judgment of fact indicated that a safeguarded arms-control agreement would be to the advantage of the national interest and security of the United States, whereas before that time he had listened chiefly to men who said such an agreement would gravely damage national security.

It is an even riskier oversimplification, but still a useful one, to say that the net policy of the United States toward arms control was reversed in this short period of months. Like most shifts of policy, this one will not be found in documents. Policy is determined by political momentums operating on the existing balance of forces in Washington. The arrival of the new group of presidential advisers set up such a fresh momentum.

How did this change come about? To begin with, this is an era in which considerations of power are determined by weapons (those existing and those in prospect) which are beyond the experience and reckoning of typical military professionals. Second, and granting exceptions, the quality of scientists and weapons experts within the government, and particularly within the Atomic Energy Commission, had deteriorated. Liberal-minded scientists who were high enough in the ranks to influence policy had in general left the government, partly to return to their creative work and partly to escape the conservative and security-minded restraints imposed by the McCarthy era, by the formalism of the Pentagon, and especially by Mr. Strauss in his administration of the AEC and in his role as special presidential adviser. Those scientists who were sympathetic to this environment and remained in government service were inclined to be conservative to the degree that they concerned themselves with policy. Few of the first team were left. The quality of scientific advice available to the President was both partisan, after being channeled through Mr. Strauss, and in many cases second-rate.

Meanwhile, scientists outside the government were inhibited from open discussion by their former or continuing access to classified information. Those who did not have such information could make general comments on national policy, but could not keep authoritatively abreast of the detailed questions at issue, such as the feasibility of inspection, the relative trends of United States and Soviet weapons, and so on, and therefore were not in a position to speak out.

Evidence is available to the writer which clearly indicates that the President and Mr. Dulles were unwitting prisoners, in their lonely isolation at the top of the government pyramid, of the special selection of knowledge and attitudes which came to them through official channels and especially through Mr. Strauss. They had no alternative against which to measure the partisan quality of this advice or its scientific inadequacies.

The Killian group brought such an alternative to the White House. It was one more effort to solve the prickly question of how to adjust science, technology, weaponry, strategy, and political policy making. The President needs the special pleading of his weapons makers and users, but he is helpless if their arguments are not tested by men of equal knowledge and standing who are not committed; otherwise there is no horse race. The President and Mr. Dulles now had a two-sided debate to help them make up their minds.

The scientists sought to provide a good quality of scientific information and judgment and to let the chips fall where they might. They recognized that policy making was the task of the President and that negotiation must rest in the hands of the State Department. Their function was to be disinterested. But however carefully they hewed to this line, the effect of their information and judgment on a situation and on men who had not been confronted with this order of scientific thinking and knowledge was to dislodge a good deal of fallacious information and inference. The facts provided by the scientists clearly pointed in a different direction of policy from those previously available. They called for a re-examination of what constitutes security for both sides. They persuasively introduced the concept of inspection as a deterrent, replacing the notion that it must be an absolute to be useful.

Mr. Dulles and his client, the President, listened with profound interest. For Mr. Eisenhower, here was authoritative technical support for the concept he had been clinging to, despite all obstacles, as an article of faith. For the Secretary of State, here was a new element of unpredictable but obviously formidable strength in the balance of forces at home and abroad over which he had been shrewdly presiding. He was so impressed with the newcomers' depth of scientific knowledge and authority, which obviously outclassed almost all of their opponents', that he admitted he had been given poor scientific advice before the new group arrived. Yet the evidence all goes to show that he did not change his own inner conviction that a new effort would be futile because the Communists would not sign. He had a deep suspicion of the Communists, abundantly justified by events. He believed that a nation operating by principles was at a disadvantage when dealing with an unprincipled nation, and feared that if we were drawn into agreements with the Kremlin on particular issues the effect on public opinion might be to undermine our ability to keep up our guard. He was determined that we should not be taken in.

As always, he bent with the breeze when the Killian committee showed its mettle. He even gave the impression that he had shifted his position and was going forward enthusiastically with the new tide of affairs. But he did not yield more than a few inches of his hour-to-hour grip on all negotiations with the Soviet Union. Dulles was still in ultimate control.

What had changed was the flow of scientific information and judgments to the President and Mr. Dulles. When the Defense Department or the AEC made statements which were inaccurate or shortsighted or slanted to a partisan purpose, the Killian group put them straight. The very fact that such statements would be scrutinized by the scientific advisers who had no vested interest acted as a brake on the self-confidence of less informed special pleaders. More and more responsibility was placed on the Killian group as the disinterested quality of its judgment became evident.

It is clear that the key to the decision-making process on arms control in Washington during this period is to be found in the thought processes, the methods of working, the policy concepts of Foster Dulles. It is a rash reporter who will give a snap judgment on this intricate individual, who kept most of the world, including his own closest associates, guessing much of the time with respect to the full dimensions of the strategy he was conducting and the specific meaning of his maneuvers at any given moment.

During the several years under discussion, he managed to persuade the President that he was doing as much as was practicable for arms control, considering the limits set by the Communists: to keep the Pentagon sullenly subservient to his primacy in foreign affairs but not greatly troubled about the likelihood of disarmament; to keep Strauss at arms length but to confirm the Strauss pessimism with respect to any agreement with the Kremlin; to make enough positive statements about disarmament so that the American people, who were apt to be sentimental on this point, could not detect any hostility on his part to the idea; to keep the Communists aware of the fact that he would not deal with them on this issue and intended to keep more propaganda pressure on them than they could apply in return. The only hard fact in this carefully contrived mixture was that arms control did not move forward.

Dulles, as the world knows, tirelessly administered policy as well as made it. On arms-control matters he wrote many of his notes or instructions to negotiating delegations, or worked carefully over drafts written by his associates. His deep distrust of Stassen caused him to spend an inordinate amount of time on day-to-day instructions during the Stassen episode. He kept this function in his own hands. Often he would work and make decisions at his house on a quiet weekend, with one or two subordinates present.

When he took over the State Department, there was a formal structure and process for arms control which he promptly modified. President Truman had set up an interdepartmental Regulation of Armaments Committee, including Secretary of State Acheson as chairman, the secretary of defense, and the chairman of the Atomic Energy Commission. The principals met infrequently. Most of the work was done at the staff level. It was sincere. General Omar Bradley encouraged it, and Mr. Acheson did not interfere. But the goal was far off. Mr. Acheson took disarmament, even as a public-opinion problem, less seriously than Mr. Dulles. Indeed, the subject was an anachronism at that period, given the onset of the cold war.

When the Eisenhower administration took over in 1952, a new pattern developed. Since Dulles took charge and worked with his peers, members of the Cabinet took a more active part in setting policy. The meetings of the formal interdepartmental committee and its staff lapsed, and when Mr. Dulles wanted help he chose it from his own staff, from the Disarmament Division of the State Department. Dulles never let this subject become implicated in the processes of the National Security Council, whose descent into formalism, frustrated infighting, and stalemated positions was recently described to a committee of Congress by Robert Lovett. When the time came for an action, Dulles worked it out, did such clearing with other departments as was necessary, obtained the President's approval, and acted. The other departments knew that he was irresistibly persuasive with the President, and treated him with proportionate respect. He in turn often disregarded or overrode them. He was capable of saying in effect, "Nonsense, Lewis, I couldn't go along with that," to Admiral Strauss and then going his own way. He was, however, more or less at the mercy of scientific verdicts from Mr. Strauss and the Pentagon, and until the Killian group arrived he had to quote them as authority on what science had in store for weapons and strategy.

An example of his working habits was the President's letter to Soviet President Bulganin in April 1958. The Killian group was pressing for direct talks between the scientists of both sides. The letter suggesting technical consultations was drafted by Dulles and an associate or two on a Sunday afternoon at his house, with Dulles doing most of the writing. He never cleared it with other departments. He simply telephoned the President and got his approval. Usually he would have no more than two or three members of the staff present on such an occasion, and when he telephoned or directly consulted the President, the latter almost never made a change in the Dulles text.

The Bulganin letter opened the way to the conference of scientists of both sides at Geneva in the summer of 1958 which reached a speedy and spectacular agreement on the preliminary technical aspects of suspension of nuclear tests. This was regarded by optimists at the time as a major break-out from the earlier pattern of sterile negotiation. This was probably the case, but it set in motion counterforces in Washington which plunged the whole subject into confusion again. Opponents in the Atomic Energy Commission, with its almost unlimited resources from the public purse, went full steam ahead with research designed to prove that test inspection was much more difficult than the scientists of the Killian group, with no research at their disposal, had initially estimated. And it was not long before Mr. Killian had to announce that the first estimates of what was necessary to distinguish underground nuclear explosions from earth tremors had been overoptimistic in terms of the detection equipment then available. Moscow immediately took this announcement for what it was—a victory for the opposing forces in Washington as well as a legitimate increase of knowledge about the problem. Since the Geneva agreement by the scientists had been based on these initially oversanguine estimates, the Russians began a long stone-walling operation of their own in which they refused to accept the new calculations or to review the Geneva agreement. It took time for the Killian group to gain headway in Washington with the argument that its fundamental position was not altered by the new findings; that detection with existing instruments and procedures would be more difficult than expected, but that these instruments were antiquated and built for other purposes. New and appropriate instruments could doubtless be developed. There were methods, such as supplementing the work of inspectors with automatic nets of underground recording instruments, and there were procedures such as random inspection, greatly increasing the deterrent effect of a given quota of trips by inspectors, which could overcome the handicap raised by the new AEC findings.

It was the position of those scientists arguing for arms control that a constructive approach to the problem called for a quite different motive than that of the leaders of the AEC. Instead of spending resources and talent to prove that a task could not be accomplished with existing methods and equipment, the situation called for spending resources and the best available talent in an effort to develop new methods and equipment to do the job. An inspection system should be started at once, it was argued, on the best terms obtainable from the Russians and without yielding the right to resume testing if the effort failed. Its purpose would be to acquaint both sides with the actual problems of detection and to assist the task of developing more adequate detection systems.

Once again, the line that divided the two factions was that between an a priori conviction that arms control was neither feasible nor desirable, and the conviction that every effort should be made to develop adequate solutions and to see if the Kremlin would accept them. As one supporter of the Killian group put it, "We surely don't know whether the Russians would or would not sign, if a reasonable inspection system were achieved and if we made our best effort in good faith to negotiate it. But one thing is sure. Considering the certain results of nuclear war and the dangers of this new kind of arms race, we could not look history in the eye if we did not try to find out. And if we do not try, we will never know whether they would be prepared to agree or not."

While pro and con arguments over these points continued, and while the Killian committee tried to arrange for research facilities in friendly hands, Mr. Dulles reasserted control. He himself made the decision and issued the instructions which transferred talks with the Russians back from the summer's technical phase to the political level, where they languished during the fall and winter. He scarcely needed to resume his familiar methods of tough and protracted bargaining because the Russians had already done it for him. But he did not lag behind. American delegations, both to a second Geneva conference on the suspension of testing and to a new Geneva conference on the control of surprise attack, were rigidly forbidden to go beyond their specific instructions at any given moment. The instructions were not to make our most favorable offers at the start, but to demand an initially high price which the Russians could be counted upon to reject and to counter with a similarly impossible price of their own—and so the usual process of haggling began again.

The scientists had hoped that the new conference on surprise attack could pass quickly into a technical stage, like the successful meeting on nuclear testing during the summer. The Soviets never permitted it to leave the political stage. Both conferences developed into the type of slug-fest for which Mr. Dulles had so great a talent.

There was ample data with which to persuade the President from week to week that the Russians were not cooperative.

The weight of evidence available suggests to this writer, at least, that Mr. Dulles had been impressed by the technical knowledge of Mr. Killian and his colleagues, and by their humane understanding of the implications of the nuclear age for civilization as a whole, but that he had not altered his own estimate of the Communists and of the way to deal with them to any significant degree. There are those who were close to him and who think they detected signs that he at least came to question this attitude shortly before his death. But if this was more than a questioning, he kept his own counsel to the last.

As the arms-control effort lost momentum on the diplomatic battleground, another factor entered the picture which virtually ended any hope for early solutions. The summit hove into view. The problem of the two Germanies and Berlin and the partition of Europe, which had been considered the most promising tangible subject for summit debate, began to seem insoluble for the present. So the hope for a significant achievement at the summit shifted to arms limitation. Neither side was likely, under the postwar bargaining tradition, to play its big cards in advance of the big game. So, apart from deepening preparations by the scientists in their field, and from efforts to reach through the fog of bargaining for some contact with scientists on the Soviet side, the whole enterprise stood virtually condemned to diplomatic slow motion for a period.

This is the point where the present review must cut off. It is still too early to appraise the change of riders in the middle of the arms race from Foster Dulles to Christian Herter.

One point is plain: the procedures of the recent past have been notably inadequate to the need. There are two aspects to this shortcoming, in immediate operation and in long-range planning.

On the operations level, the Secretary of State now has an expanded Disarmament Section directly responsible to him, with adequate freedom to function without bureaucratic inhibitions. Under Mr. Herter this section issues day-to-day instructions to American negotiators. Short-range authority is in its hands.

However, Mr. Herter is less inclined than was Mr. Dulles to ignore or override the opponents of arms limitation in the Defense Department and the AEC. For one thing, the President is now taking a more active part in the direction of affairs. Whereas he left the drafts and recommendations of Mr. Dulles unchanged, he now frequently leaves his own mark on those of Mr. Herter. For another, Mr. Herter is more judicial and less arbitrary and self-centered than

Mr. Dulles. He not only listens to his own staff, he deals with the other departments of the government with constitutional respect. He also has a quiet constitutional respect for his own position, which is that of primacy in foreign affairs.

But the net result of this statesmanlike approach is to place his department more at the mercy of vetoes exercised by Defense and AEC. The State Department can move only with caution and by small hobbled steps in any give-and-take with the Russians. The moment it takes a substantial step, the other departments declare that it goes beyond agreed policy and insist on being consulted. So each significant move forward precipitates another interdepartmental debate, and the struggle between rival factions has to be acted out all over again. Disputes at the working-staff level are referred to their principals. Disputes between principals go to the President.

This flaw in the negotiating procedure has usually been, and can continue to be, fatal to an intelligent probing of Communist response. Interdepartmental agreement in Washington is always at the minimum level of common consent. Instead of approaching the Russians with a coherent knowledge of how far we will go if the Russians reciprocate, which is indispensable to a negotiation intended to get results instead of to block them, we approach them by blind navigation. We have agreed in Washington only on the next step.

The approach to negotiation is from the wrong end. The Russians understand this procedure, of course. It is theirs also, in the sense that their negotiators are given short shrift. But they must also understand something else: that this was the tried and true method of discouraging agreement in the period when we did not want one. If today our purpose has at all changed, they will not readily discover it from our largely unchanged maneuvers.

If we could plan ahead, if we could instruct our negotiators, after having thought out the possible course of bargaining, if we knew how far we could ultimately go when it came to the showdown—if, in other words, we knew what we wanted to do and had taken a policy position among ourselves as to how far we could go to achieve it—then we would behave like men negotiating in good faith, with a firm knowledge of what we consider an honorable and useful result and of the limits beyond which we would not go. Instead, we start out with only a minimal position—and this is our policy position.

Facilities for long-range planning would not be a panacea. The political process within the United States—that of adjusting conflicts and of educating viewpoints by the pressure of events, plus foresight—cannot be reduced to a neat problem and fed into the perfect agency. This would help, to be sure. Harassed and overburdened leaders can surely be induced to plan further ahead if long-range thinking is required of them and if they are capably aided by men given this assignment.

But, knocking heads together, furnishing the momentum of leadership, ruling unruly executive departments, treating with Congress, seeking the support of an informed public—these are the inescapable tasks of the President in matters of so great an importance as the nuclear-arms race and the purpose of our dealings with Communism. Leadership like this requires both political courage and intellectual courage.

HUBERT H. HUMPHREY

Government Organization for Arms Control

THE SUBJECT OF THIS CHAPTER is how our government should be organized to formulate and then implement arms-control policies. It does not discuss what the policies should be, but rather the manner in which individuals might work together in order to reach and implement decisions regarding policy.

Before there can be intelligent discussion of the recommended forms of governmental organization, the government and the people must know how much importance to attach to arms control. Is the control and reduction of armaments a realistic goal to seek in today's world? What priority should arms control be given? Answers to these questions are required in order to place arms-control organization in the framework of our system of values and goals and so that efforts to make progress proceed from commonly accepted assumptions.

The control and reduction of armaments, in my opinion, should be at the heart of United States foreign policy. Of necessity, we have been indulging in the first arms race in our history. Now there is evidence that our major adversaries would prefer to reduce the tensions resulting from a build-up in armaments and take steps to minimize the danger of war. No one can predict with certainty that progress on arms control is possible, or that success in controlling and limiting one category of weapons will lead to success in other categories. But we shall never know what accomplishments are possible unless we make the effort. Arms control may be the key to the future security of this nation, and, indeed, of the peoples of the entire world. It should be given the highest priority by the government.

In the preparation of this chapter, I wish to acknowledge the helpful assistance of Miss Betty Goetz, member of the staff of the Foreign Relations Committee and the Staff Assistant to its Subcommittee on Disarmament.

Given these assumptions there are basic tasks the government should be prepared to carry out. Effective organization for arms control requires: (1) joining together the relevant political, military, and scientific factors; and (2) utilizing these political, military, and scientific factors, to form decisions regarding arms-control policy and to execute expeditiously the decisions reached. Whatever government machinery is devised should be geared to facilitate the accomplishment of these basic tasks.

No amount of organization, however, can be expected to act as a substitute for Presidential leadership. At the top there must be a person who believes in the importance of arms control and who is willing to give the subject adequate and sustained attention. The President must also be willing to involve himself in the inevitable controversies that will surround policy questions in the arms-control field; he must be willing to take the time to listen to the arguments and then make firm decisions. Certain organizational structures may be superior to others, but none can be a replacement for Presidential leadership and prompt and firm Executive decision-making.

The Secretary of State also has an important role in arms-control policy. Although several agencies of the federal government are concerned with arms-control policies, the Department of State has a key function in formulating and executing them. The attitude of the Secretary of State, therefore, is vital. If he believes there is an opportunity to halt the race in armaments and to divert the two major power blocs from military competition to competition in more peaceful pursuits, he will make certain that arms control receives the time and study it deserves. If he thinks that arms control is not a feasible alternative to an arms race or that other nations are not prepared to treat it seriously, then it will likely receive but limited attention.

These considerations point to the conclusion that juggling, reshaping and drawing new lines on an organization chart cannot determine conclusively that the United States will earnestly and persistently seek progress on arms control. Always more important than organizational structures are people—their views, their convictions, their dedication to tackling a problem and solving it.

Governmental organization, nevertheless, deserves serious thought and scrutiny. An examination of past organization and of the problems and gaps that have developed will point up the type of machinery needed in the future. In the next section I shall first describe briefly the organizational structures and methods of carrying on arms-control activities within the Executive branch, and then evaluate their effectiveness and workability.

Analysis of Past Forms of Organization

From 1946 until mid-1955 the Department of State had the major responsibility for problems of disarmament. The Atomic Energy Commission, however, played an important role in the development of the Baruch Plan for the control of atomic energy. The Commission also furnished the Department of State with technical data to be presented before the United Nations Atomic Energy Commission. But disarmament negotiations in the United Nations and with individual countries were handled through the State Department's Bureau of International Organization Affairs. Benjamin Cohen, Morehead Patterson, and James Wadsworth, and all the other United States negotiators reported directly to the Secretary of State.

In March 1955 the President appointed Harold Stassen, then head of the Mutual Security Program, to be his Special Assistant for Disarmament. Mr. Stassen was directly responsible to the President and was given a seat in the Cabinet and on the National Security Council. He was also considered to be under the general supervision of the Secretary of State.

Mr. Stassen gathered together a group of persons from various departments and agencies in the government: the Department of State, the Central Intelligence Agency, the Atomic Energy Commission, the Department of Defense, the Department of Justice, and the United States Information Agency. In addition, he appointed the chairmen of several task forces to study appropriate disarmament inspection systems, i.e., nuclear materials, aerial inspection, army and ground units, navy and naval weapons, national budgets, steel, power and industry, and the use of communication in inspection. These task forces were charged with the responsibility of devising workable inspection measures. The Special Disarmament Assistant said of the task forces:

> As a result of their studies. . . . I believe we shall have something we have never had before—a detailed operating manual of what to inspect, how and where it would be inspected, and a knowledge of what can and cannot be profitably inspected if we seek to provide a safeguard against surprise attack and to supervise an international arms limitation agreement.[1]

All negotiations on disarmament during Mr. Stassen's tenure of office were handled by him on the basis of negotiating papers approved by the National Security Council, except discussion of arms control in the United Nations, which was the chief responsibility of the United States Ambassador to the United Nations, Henry Cabot

Lodge. Even in the United Nations debates, however, Mr. Stassen played an active part.

With Mr. Stassen's resignation at the beginning of 1958, the main responsibility for arms-control policy was returned to the Department of State. Jurisdiction over disarmament, however, was removed from the Bureau of International Organization Affairs and transferred to the newly established Office of the Special Assistant to the Secretary of State for Disarmament and Atomic Energy, where it remains, as of the writing of this paper.

The Department of State has had no funds or staff to conduct any studies of the various political, military, and scientific problems involved in arms control. Some studies, particularly those on the technical aspects of detection and identification of nuclear weapons tests, were made under the general direction of the Office of the Special Assistant to the President for Science and Technology. Other technical studies on this subject were carried out by the Air Force Technical Applications Center in the Department of Defense, by the Division of Military Application of the Atomic Energy Commission, by the Central Intelligence Agency, or by private research groups under contract to these government agencies. In most cases these studies were made on an *ad hoc* basis, with little coordination by a central authority. Few studies were made on the relation of arms-control plans and proposals to national security interests, military strategies, and United States political objectives throughout the world.

Under this organizational structure, policy on arms control was formulated by a Committee of Principals consisting of the Secretary of State, the Secretary of Defense, the Chairman of the Atomic Energy Commission, the Special Assistant to the President for Science and Technology, and the Director of the Central Intelligence Agency. Before meetings of the Committee of Principals, discussions of policy questions were usually held by an interdepartmental committee of officers from these five agencies. The drafting of proposals was done by the Department of State, and the technical details to buttress such proposals were supplied by way of the President's Adviser.

Problems in Improving the Present Organization

Each of these various forms of organization has its advantages and disadvantages. As one who has closely observed the workings of government in this field over the past five years, I have reached certain conclusions about the problems which developed and which should be avoided. I have also noted those methods of organization that, in my opinion, should be retained and expanded.

Let us first consider the case of a Special Assistant to the President for Disarmament. The greatest advantage of such a Special Assistant is that he has the ear of the President. He can go directly to the President and confer with him on policy, proposals, and even problems with government agencies. He need not be restricted by the budgets of the regular departments, and by being a member of the Cabinet and the National Security Council he is on a par with the heads of other departments.

There are three main disadvantages to the status of a Special Assistant for Disarmament. First, by being outside of the Department of State, the agency with primary responsibility for dealing with foreign policy and carrying on relations with other countries, there is always the danger that the Special Assistant will act counter to other foreign-policy considerations. During the period of the Special Assistant this did occur, with the consequence of antagonizing officials within the State Department and causing confusion and uncertainty in the capitals of other nations as to what United States policy was.

Second, the Special Assistant acted as the chief United States negotiator at disarmament conferences and, therefore, was often away from the seat of government. When questions of policy then had to be resolved back in Washington, the Special Assistant had no one of sufficient stature to represent him before the President and to argue policy matters with other agencies having an interest in the position being taken by the United States. During 1957, when Mr. Stassen was out of the country, he evidently acted quite contrary to the wishes of Mr. Dulles, then Secretary of State. In the absence of Mr. Stassen, Mr. Dulles was in a position to prevail upon the President to curtail Mr. Stassen's authority. This experience has made the Department of State reluctant to transfer any of its jurisdiction and authority over arms-control matters to anyone outside the Department.

A third problem connected with the role of a Special Assistant involves the availability of information to be released outside the Executive branch. The Disarmament Subcommittee of the Senate Committee on Foreign Relations has experienced the not uncommon difficulty of obtaining information from the Executive branch of the government. This difficulty is compounded under the status of Special Assistant in that he is able to plead executive privilege and thus deny to any committee of the Congress, public group, private citizen, or member of the press information on any aspect of the problem which it is to his interest to deny. The Special Assistant to the President for Science and Technology and the Special Assistant to the President for Disarmament have used executive privilege to deny information to the Senate Disarmament Subcommittee, as well as to the public at large. Earlier I mentioned the creation of eight task forces by the Special Assistant for Disarmament. When committees of Congress requested information pertaining to these studies, executive privilege was used as a reason for the refusal to share information. If the claim of executive privilege is to be used by any office or individual connected with the White House on such important matters as disarmament, even when they are not highly classified, then this is an important drawback to a similar organizational pattern for the future.

Just as there are advantages and disadvantages in having a Special Assistant for Disarmament in the White House there are advantages and disadvantages in having disarmament matters be primarily the responsibility of the Department of State.

The main reason for giving the Department a primary role in arms-control matters is that little can be accomplished except through negotiation with other countries. This is clearly the responsibility of the Department of State. It must coordinate policy with friendly governments; it must select and instruct the negotiators to arms-control conferences; and it must determine that arms-control proposals do not conflict with other aspects of United States foreign policy.

During the decade after World War II, when disarmament was viewed almost solely as a political problem of foreign policy, other agencies of the government were apparently content to give the Department of State a free rein over the formulation and execution of policy. Furthermore, the cold war, as well as a hot war in Korea, were at their height, and any progress toward arms reduction was considered remote.

Beginning about 1955, arms control as an instrument of national policy began to grow in importance. Thus when the State Department in 1958 reclaimed its authority over policy, the interests of other agencies had been aroused, and the gaps in our machinery and the disadvantages of relying on the Department of State for policy formulation became apparent. During this period almost every decision had to be thrashed out in endless argument among at least five principal agencies: the State Department, the Atomic Energy Commission, the Defense Department, the Office of the Special Assistant to the President for Science and Technology, and the Central Intelligence Agency. On the four occasions from 1958 until mid-1960 when arms-control discussions took place, the United States entered these conferences in various degrees of unpreparedness.[2] Decisions were taken only after prolonged debate and delay. For months during the conference on the discontinuance of nuclear-weapon tests, the United States negotiators in Geneva lacked direction on key proposals because of the inability of the government back in Washington to reach any workable compromise. I am told that if it had not been for the President's Science Adviser, who had access to the President, it is questionable that any progress could have been made during this period. The State Department was unable by itself to exert leadership in this field.

An added complication to the formulation of arms-control policy was the existence within the Department of State of serious differences of opinion. What appeared feasible and acceptable to the Office of Disarmament and Atomic Energy was objected to by other bureaus in the Department. For example, the Disarmament Office has been known to be interested in developing possible proposals for anti-surprise-attack zones in Europe and possibly in other areas. This suggestion has met with the firm opposition of the Bureau of European Affairs, where there is a strong view that the development of zones in Europe might jeopardize the reunification of Germany. There has been discussion of possible zones of arms control in Asia, but the attitude of the Far Eastern desk toward any participation of Communist China in these argeements has precluded effective and intelligent discussion of such possibilities.

Conceivably, the Department of State should have been able to resolve these political controversies by utilizing its own Policy Planning Staff. At least there was machinery in existence that could be given the assignment of studying such problems. However, other problems arose, particularly in the technical field, for which no government machinery existed. The result was to set up *ad hoc* groups which were expected to produce solutions within short periods of time.

The Stassen task forces mentioned earlier are an example of the use of *ad hoc* groups. Although it was claimed that the studies to be undertaken by these groups would contribute significantly to our understanding of arms-control problems,[3] it is unlikely that most of these groups fulfilled their assignment. No reports have ever been made public, and there is little indication that American disarmament policy reflected any accomplishment on the part of these groups.

Three years later, in the fall of 1959, another *ad hoc* appointment was made and with about the same degree of success. The Secretary of State appointed Charles Coolidge, a Boston lawyer, to assemble an *ad hoc* staff to conduct a review of disarmament policy. Evidently this study was thought to be totally inadequate. It has been kept highly classified, even though the appointment of Mr. Coolidge was hailed as an important development.[4] Unfortunately, the State Department placed its full confidence in this group, and when its report in January 1960 was found to be useless, the Department had to begin to formulate a policy from scratch, only a few days away from high-level meetings with other nations which had been called for the purpose of coordinating the policies reached by each nation individually.

These examples illustrate an important point, namely, that *ad hoc* groups cannot be expected to review in the space of a few weeks or months so important a subject as arms-control policy and produce sound and substantial results.

A further example of the lack of machinery can be seen in the experience of the government in attempting to acquire additional information on the detection and identification of nuclear explosions. In this case regular agencies of the government were called upon to carry out the assignment, with the following results.

Reference has been previously made to special studies being undertaken on the detection and identification of nuclear explosions by the Department of Defense and the Atomic Energy Commission. That additional studies should be conducted was decided at a meeting on 23 April 1959, attended by the Deputy Secretary of Defense, the Chairman of the Atomic Energy Commission, and the Special Assistant to the President for Science and Technology. Among the projects to be carried out by the Atomic Energy Commission was one (Project Cowboy) on ways to conceal nuclear tests. The Department of Defense was assigned the study of ways to improve the detection and identification of underground nuclear explosions (Project Vela). Before the end of the year the AEC had completed a series of experiments on concealment. The Defense Department, however, did not start its research on Project Vela until the following year. There was a delay of several months while two divisions of defense (the Air Force Technical Applications Center and the Advanced Research Projects Agency) argued which should be responsible for the project.

The enthusiasm with which the AEC entered into the study of possibilities of concealment, compared to the haphazard way in which the Department of Defense approached the study of improving possibilities for detection illustrates an important lesson aptly described by Dr. James B. Fisk, President of the Bell Telephone Laboratories, Vice-Chairman of the President's Science Advisory Committee, and former chief U.S. delegate to two international technical conferences concerned with the discontinuance of nuclear weapons tests. Dr. Fisk said:

> While the Department of Defense and the Atomic Energy Commission will always have a great interest and responsibility and will make contributions in this field [of arms limitation], they should not be expected to carry the burden both of maximizing and, simultaneously, minimizing arms.[5]

Disarmament raises difficult political as well as technical problems. Whatever type of organization is established, it must be able to meet these problems effectively and in a way that permits the United States to present its case before the world in the most positive form.

I come now to my own recommendations for constructing a government organization to deal with arms-control issues.

Need for a Special Agency

A special agency should be established within the Executive Office of the President. I have suggested it be called the National Peace Agency,[6] but it need not be called by this title. I am aware that some students of disarmament who favor the creation of a special agency think its title should be more directly related to arms-control matters. Its principal functions should be to conduct research, to coordinate policy, and to formulate plans and proposals dealing with arms control.

The agency should be established by Congressional action, it should have its own budget, and its authority and functions should be clearly prescribed by law. The director of the National Peace Agency would be directly responsible to the President, but in important respects he would also be responsible to the Secretary of State.

This recommendation follows from the analysis in the preceding section which points up an important conclusion, namely, that arms control cannot be restricted to foreign-policy considerations. Arms control is much more than a problem of foreign policy. It involves the vital question of defense policy. It fits into every element of science and technology affecting national security. Because arms control involves more than the Department of State—i.e., the Department of Defense, the Atomic Energy Commission, and other agencies—I have recommended that the agency handling it have a status and an autonomy of its own. It would not be a negotiating agency but a technical and planning agency. It should have a close and direct relationship to the Department of State, which must have the responsibility of conducting actual negotiations and the coordination of United States policy with that of other countries.

The research and experimentation to be undertaken by the Agency can be grouped in three major categories. The first deals with military and political considerations in arms control, and how these would be affected under certain kinds of proposals. Some needed studies in this category are as follows:

1. The military significance of various types of agreements and their effect on specific military strategies and weapons systems.
2. The political and military advantages and disadvantages of linking together various arms-control proposals.
3. The political and military significance of inspection techniques and their possible impact on the Soviet Union and other states.
4. The importance and efficacy of intelligence as a supplement to functions of control systems to verify compliance with agreements.
5. The effect of technological development on various types of arms-control agreements.
6. Studies of demilitarized zones and the possible stationing of an international police force in areas of potential armed conflict.
7. Political problems connected with the inclusion of Communist China in an arms-control agreement.
8. Studies of control measures to halt or slow down the arms traffic to disturbed areas, such as Latin America and the Middle East.

A second category concerns research on the technical and scientific requirements of verification, inspection, and the monitoring aspects of agreements on the control and reduction of armaments. Many of the elements in these studies must be integrated with the studies in the above category concerning military and political problems. Studies in the technical and scientific group include:

1. The detection and identification of nuclear-weapons tests.
2. The detection of missile tests and the launching of vehicles into outer space.
3. Measures to guard against surprise attack by long-range weapons, missiles, bombers, naval craft, conventional armaments, and armed forces.
4. Control systems to verify the cut-off of production of nuclear weapons.

5. Verification measures for a reduction in conventional armaments and armed forces.
6. Verification measures for the reduction and/or elimination of the production of chemical, biological, and radiological weapons.

A third category of studies concerns the economics aspects of arms control. Although the national economy would ultimately benefit from a reallocation of resources from weapons development to peacetime goods, certain industries and specific geographical areas would have adjustment problems. These should be looked into in advance of any arms-control agreement. Some of the questions to be studied in this connection are:

1. How would specific arms control proposals affect certain segments of the economy?
2. What adjustments might be considered?
3. What policies and action should be formulated and carried out by the Federal Government to assure the least disruptive transition of the economy under conditions of substantial disarmament?

These three categories of studies—the political and military, the scientific and technological, and the economic—are not being undertaken to any appreciable degree within the Executive branch of our government at the present time. They all fall properly within the scope of a National Peace Agency.

It would not be necessary for the National Peace Agency itself to undertake each research project. Many could be contracted out to private institutions and industry. Some could be carried out by other government agencies. In the economic field, for example, the Business and Defense Services Administration of the Department of Commerce would be equipped to conduct certain studies. In the field of military strategy the Department of Defense would obviously have a key role, and on political questions the Agency should be able to call on the Department of State for assistance.

What is important is that the Agency have the authority to engage in the studies that should be made if our arms-control policies and negotiations are to be grounded in solid support. Furthermore, it is vital that the results of studies in one area be related to the conclusions reached in other areas. The requirements for measures for inspection and measures for control of individual disarmament might be different if two or more were combined. In other words, some of the features of one control system probably can be utilized in another control system, with the advantage of reducing the complexity of control measures in general.

The Peace Agency should have responsibilities other than those in the area of research. One of these should be in coordinating policy. Ways should be found to join together diplomatic and political policies on the one hand, with defense policy on the other.

On many occasions during the past few years the Defense and State Departments have followed contradictory policies affecting arms control. These are some examples. Beginning in 1954, the Defense Department devised a military-defense strategy of massive retaliation which involved giving first priority to nuclear weapons with vast destructive power, the equivalent of hundreds of thousands and even millions of tons of TNT. To deliver these weapons, the Defense Department concentrated on building a long-range strategic bomber force. To provide facilities for such a force required the construction of special air bases in key countries around the world.

At the same time the Defense Department ordered a cutback in conventional military strength, in part because the need for military manpower and conventional arms under a defense policy of massive retaliation was minimized, and in part to reduce the defense budget.

In the meantime one important development was becoming apparent to the State Department. The major military threat to the United States and the free world was not solely one of a knockout blow resulting from surprise attack. Most of the threats of war were on the periphery of the Soviet Union and were of a type which was more likely to require the availability of conventional arms and armed forces than heavy nuclear armaments. Furthermore, it was becoming apparent that many of the countries along the Soviet periphery did not want to be part of the battlefield for a nuclear war. They wanted to be free, not only free from the tyranny of Soviet and Chinese Communism, but also free from the evils of radio-active fallout.

The Department of State, therefore, began talking about nuclear disarmament at the very time when the Defense Department and the Atomic Energy Commission were at the peak of their interest in the development of nuclear weapons and in reliance on nuclear weapons for defense. Every move for the control of nuclear weapons made by the State Department was opposed by the Department of Defense and the Atomic Energy Commission.

Another example. Occasionally the State Department would suggest to the Soviet Union that armed forces be reduced. No sooner was such a proposal made on our part than an announcement would be made from the Pentagon that armed forces would be cut back unilaterally. Thus, any bargaining power the United States negotiators might have had was dissipated. The unilateral cutback might have had some use at least if it had been publicized as evidence of the sincere desire of the United States to work toward peace. No such message was carried to the people of other countries.

Other illustrations could be given to show that what political officers were proposing in the area of disarmament was contrary to, or was undercut by, the military. They point up the need for a centralized authority to coordinate national security policy so as to blend defense, disarmament, and political objectives so that United States policy-makers will make sound decisions and so that United States negotiators and information specialists can sell and publicize our proposals to full advantage.

It is important that the National Peace Agency be established under legislative authorization instead of executive order. For one reason, the Congress can be satisfied that the Agency's authority is adequate to compel coordination of policy with other agencies. Congress can also specify exactly what authority a National Peace Agency should have and what research it can initiate. In adopting any bill to create a National Peace Agency the Congress should also state that such a body cannot hide behind the cloak of executive privilege and thus deny information to the Congress and the people. If the Agency is established by law and located in the Executive Office of the President, rather than being appointed by the President and located in the White House, its authority would be strengthened, and its officers would be less justified in pleading executive privilege.[7]

The creation of a National Peace Agency is not the only organizational change that should be instituted. The Office of Disarmament and Atomic Energy in the Department of State should be elevated. At the present time the head of this office has the status of a Special Assistant to the Secretary of State. He should be made an Assistant Secretary, at the least.[8]

The responsibilities of the Department of State in the area of disarmament remain considerable, larger than those of any other single department. The coordination of United States policy with that of other countries, the conduct of day-to-day negotiations, and the handling of disarmament debate before the United Nations—all belong to the Department of State.

In short, the role of the State Department in arms control is at least as vital as in any other area of foreign policy. The disarmament office, consequently, should be of equal rank with the major geographical desks and other principal divisions of United States foreign policy.

The Role of Congress

Although it is not responsible for the formulation and execution of policy, Congress, and particularly the Senate, has important functions in arms control. They can be grouped in five categories: (1) to appropriate funds to cover the cost of arms-control activities; (2) to give advice and consent to the making of treaties (Senate consent to treaties requires a two-thirds vote); (3) to provide general advice to the President and his chief advisers in foreign policy and national security affairs; (4) to enact laws that can affect both policy and organization; and (5) to approve all officials appointed by the President under legislative authority.

Since some discussion of the need for legislation has already been given above, and since the approval by Congress of the appointment of officials is not very germane here, I shall limit my remarks on the role of Congress in arms control to the first three functions.

Until very recently appropriations for arms-control research and related activities have not been asked for, granted, or even considered necessary. The idea that millions of dollars should be spent on developing a control system for prohibiting the production of nuclear weapons, for example, is new and strange. Actually it is just is important to know what types of control are necessary for disarmament as it is to know what types of armaments are necessary for defense. Both intimately affect our national security.

On four occasions during the First Session of the 86th Congress, I tried to obtain funds for special arms-control studies: State Department appropriations, Defense Department appropriations, the Supplemental Appropriations bill, and appropriations for Mutual Security. Each time I was unsuccessful, in part because Congress did not realize the need was urgent and in part because the Executive branch gave practically no support to this effort.

That defense and disarmament are twin features of national security is only beginning to be comprehended. The committees of the Congress that have jurisdiction over foreign relations, armed services, and atomic energy have the special responsibility to make known to other members of Congress and to the public the importance of arms control today, and also the need to prepare for negotiations by conducting the appropriate studies and research, lest the proposals offered at the conference table are found too late to be either not feasible or else inimical to interests of national security.

The role of the Senate in the ratification of treaties is a vital one. The requirement of a two-thirds vote means that very large support and an understanding of the position of the Executive branch on any treaty that is negotiated must be forthcoming from the Senate. A two-thirds vote also means that the subject of any treaty must transcend partisan politics. Seldom does the political party in control of the Executive branch have the strength in the Senate to command or expect the support of 67 Senators. The Executive branch should not wait until a treaty has been negotiated before it consults the Senate. If it does, the Senate has the awkward choice of either a routine approval of the treaties submitted to it or of refusing consent to the product of months and perhaps years of labor and negotiation.[9]

To what extent the Executive branch should consult the Legislative branch in the formulation of arms-control policy and the negotiation of treaties must be worked out through experience. Very little actual consultation takes place today, and the little that does is usually initiated by members of Congress.

It is important to distinguish the act of consulting from the act of giving information. Although the submission to Congress of information pertaining to arms control is by no means thorough, it is far greater than the amount of consultation that takes place. The Disarmament Subcommittee frequently has received information from the Executive branch about policies that have already been decided. Seldom has it been invited to participate in a discussion before policy decisions have been reached.

The third major function of Congress (especially the Senate) in the area of arms control comes under the broad category of advising the President. This is, of course, closely related to the procedure of Executive consultation of the Senate regarding the negotiation of treaties.

Because I myself believe that the Senate must be kept informed of the policy of the Executive branch during the course of negotiating any treaty dealing with arms control, as chairman of the Senate Foreign Relations Subcommittee on Disarmament, I have held hearings on numerous occasions during the entire period of the negotiations for the discontinuance of nuclear-weapons tests. The Joint Committee on Atomic Energy also held hearings during this period. These hearings, plus discussion and debate on the Senate floor, give every member of the Senate the opportunity to become informed. Moreover, by being apprised of developments in negotiations, Senators can if they wish register their views before the President and the Secretary of State, either collectively through the passage of resolutions, or individually through private discussion and communications. Through such procedures the Executive branch is in a much better position to judge the receptivity of the Senate to a treaty than if the Senate remained silent during the course of negotiations with other countries.

The Senate, however, should not wait until a treaty is being negotiated before advising the President and his appointed officers about arms-control matters. If it did, the Senate would have little voice in influencing policy, and it would not be properly performing its constitutional role of advising the President. Most of the work of the Senate Disarmament Subcommittee has been directed to informing the members so that they could perform their advisory role intelligently. The studies, hearings, reports, speeches, inquiries, and correspondence of the Subcommittee and its members have had an effect on the formulation of arms-control policy—to what extent, it is difficult to measure.

The Necessity for Reorganization

In concluding my discussion of government organization for arms control, I think one point must be stressed. The need to reorganize, revitalize, and expand the machinery of government to handle arms-control affairs is urgent. The United States cannot proceed with arms-control negotiations at its own pace. Negotiations cannot be postponed for years while our organizational structure evolves. Nor can we expect other countries to bide their time while we decide how to put our own affairs in order. Science itself cannot be held back. In the absence of control and elimination, the nuclear and other weapons resulting from advances in technology will spread to many countries. The weapons being produced and developed today are becoming increasingly automatic. Once they are sent on their mission, they cannot be recalled, and they are weapons against which there is little or no defense. Thus the danger of a run-away war is becoming greater all the time. Outer space may become a battle field for military competition if progress is not made through international agreements in reserving it for peaceful exploration and pursuits. This is a new dimension in arms control that necessitates immediate attention. These are the realities with which governmental organization for arms control must cope with all dispatch.

REFERENCES

1 United States Senate. Senate Foreign Relations Subcommittee on Disarmament, Hearings on the Control and Reduction of Armaments, Part 1, 25 January 1956, p. 12.

2 The four conferences referred to are: (1) the Conference of Experts to Study the Methods of Detecting Violations of a Possible Agreement on the Suspension of Nuclear Tests, held from 1 July 1958 to 20 August 1958; (2) the Conference of Experts for the Study of Possible Measures Which Might Be Helpful in Preventing Surprise Attack, held from 10 November 1958 to 18 December 1958; (3) Conference on the Discontinuance of Nuclear Weapons Tests, convened 31 October 1958 and still in session; and (4) Conference of the Ten-Nation Committee on Disarmament, held from 15 March 1960 to 27 June 1960.

3 See the testimony of President's Disarmament Assistant quoted on page 969.

4 In a major speech on disarmament on 13 October 1959 before the United Nations General Assembly, United States Ambassador Henry Cabot Lodge said of the Coolidge appointment: "As for the United States, President Eisenhower has recently set in motion a new and thorough review of disarmament in the light of present-day technology. This review will prepare us to participate fully and constructively in the deliberations scheduled for next year."

5 United States Senate. Senate Government Operations Subcommittee on National Policy Machinery, Hearings, 26 April 1960.

6 On 4 February 1960 I introduced a bill, S.2989, to establish a National Peace Agency.

7 There is another reason why any new independent agency should be established by Congress. According to present law, no money can be used to pay the expenses of any agency or instrumentality (including those established by executive order) beyond one year without Congressional approval. See Section 213 of the Independent Offices Appropriation Act of 1945, adopted 27 June 1944, Title 31 of the US Code, Sec. 696, 58 Stat. 363.

8 On 8 March 1960 I introduced a bill, S.3155, to create an Assistant Secretary of State for Disarmament and Atomic Energy.

9 The Senate does not have the option of substantially altering the language of a treaty without running the risk of subjecting it to complete renegotiation.

ITHIEL DE SOLA POOL

Public Opinion and the Control of Armaments

THE THESIS OF THIS ESSAY is that an effective system of arms limitation should embody the conscious use of propaganda as an instrument of control. The thesis rests on two premises which not everyone accepts: that the state of public opinion in the major powers can greatly affect how an arms-control system will function; and that the state of public opinion both at home and abroad is capable of being influenced by a well planned strategy of action.

The Shaping of Public Opinion

The primitive science of public opinion has many hallmarks of mythology and folklore, including the simultaneous acceptance of contradictory propositions. For example, we say, "Look before you leap," but we also say, "He who hesitates is lost." Similar contradictions can be found in the realm of public opinion. We are told that there is no real public opinion on foreign policy—Congressmen often say that no one ever lost an election on the score of foreign policy—yet we are also told that "wars are made in the minds of men." Both statements partake of truth. We talk about the magic weapons of the "hidden persuaders," and, on other occasions, deplore the apparent inability of persuasion to overcome public apathy about such important causes as arms control.

Truth is more complicated than such proverbs, though not antithetical to them. The serious student of public opinion must start by making distinctions. There is a difference between public opinion in situations in which people feel effectual and situations in which they feel impotent, when they are dealing with issues they cannot understand or with a regime they cannot affect. There is a difference between public opinion on matters which affect the believer at first hand, e.g., unemployment or juvenile delinquency, and public opinion on matters known only through mediated experience.[1]

Foreign policy is generally a matter of the latter kind. Though war itself is part of the immediate experience of most of us and a subject on which we have intense personal reactions, armament policy is not. The technical problems of arms control are an extreme example of an important public issue in which people are asked to judge things far outside their range of experience.

We have some knowledge of how people handle information when first-hand experience does not provide a guide. In part, they use homely analogs. People judge international disputes by reference to familiar principles about private quarrels. They reach conclusions about public finance by reference to familiar principles of household management.

Besides analogs, they use authority. Of the various types of authority, one is of transcendent importance. That is the behavioral model provided by an authority figure such as a head of state. (This point is discussed by Freud in *Group Psychology and the Analysis of the Ego.*)

The essential function of such an authority figure in the shaping of public opinion is not the dissemination of information. Eight out of ten, or even ninety-nine out of a hundred of their countrymen would not normally know what Eisenhower or Khrushchev or de Gaulle or Nehru had said in his last major policy speech. More, indeed, would know than if the same information had been disseminated by any other statesman, but for the sheer diffusion of information, speeches seldom compare with the headlines about the day's top news events. A satellite shot into space, a congressional filibuster, or a lunch counter sit-down, or a U-2 shot down will outscore a Presidential speech on a public information test. True, there are exceptions. There were Roosevelt's fireside chats or Churchill's "Blood, sweat and tears." The point is not to deny the power of the truly great orator, but to show that the power a leader has over public opinion is even more important in another direction than it is in imparting information.

Facts are only the raw ingredients of public opinion. Facts do not talk for themselves. The learner needs guidance on how to interpret new information and how to conduct himself in the face of it. It is for that reason that a behavioral model is crucial. Let us think back to when Soviet missiles were first reported to be making successful flights of intercontinental range. That was a fact disseminated in the press. Suppose the President of the United States had immediately called for emergency spending, had placed one-third of the Strategic Air Command in the air, and had himself started sleeping in a bomb shelter. The "fact" would have assumed quite different proportions than if the President found it barely worthy of comment, played golf, and left the budget untouched.

There are few limits to what a respected national leader can call on his people to do if by his own conduct he gives a model of appropriate response to the facts of a situation. In 1940 Winston Churchill, in magnificent prose, exhorted a people, whose armies were in full retreat, to act with heroic courage, promising neither hope nor reward. But no rhetoric could have turned the trick if Churchill had spoken with wavering voice or from a hiding place overseas. It was the character of the man and his personal conduct which carried the exhortation and provided the model of how to handle the facts he disseminated.[2] The miracle of British courage—a manifestation of public opinion—was inextricably linked to an extraordinary feat of leadership.

In much the same way the miracle of present American unconcern in the face of the danger of our obliteration has been linked to another feat of leadership. In ten years the United States has passed from the foremost military power on earth with a monopoly of atomic power, consonant with its traditional self-image as fiercely competitive in striving to be the biggest, the strongest, and the best, to a nation for the first time under the constant cloud of destructability. American might based upon a nuclear arsenal has thus been rendered useless as an instrument of policy except for deterrence of nuclear attack, for we lie open at all times to obliteration. Yet this dire decline of America in the world has been accepted by the American people with utmost equanimity. There have been no riots, no war party formed, no calls for impeachment. The stock market continues at reasonably high levels and we persist in a mood of confidence. It is indeed a bit of a miracle, the explanation of which lies in the extraordinary behavioral model of serene self-confidence provided by the President. His peaceful mien, his insistence on normal behavior have effectively prevented any fact from becoming a signal for military alarm. This conduct has enhanced America's reputation for peacefulness among the nations of the world. It has probably lessened national security. But whether one approves or disapproves, it remains a feat of leadership.

The moral is that public opinion and leadership are joint products, not mathematical complements in which the more of one means the less of the other.

Public opinion, it appears, is something more than facts the public knows and values to which it adheres. There is a third ingredient, which may be described as the implication for personal action as seen in the facts and values: how much attention should one pay them, what personal consequences are they felt to have, and what mode of behavior is seen as fitting in the light of them. For matters outside the spheres of men's private experience, the implications for personal action are largely derived by reference to the behavioral models provided by leaders. Among these reference persons the head of government is pre-eminent.

There exists in the stock of information available to the American and Russian people full evidence of the destructive potential of modern weapons. Surveys on civil defense in the United States have shown that public estimates of technical facts on the destructive power of thermonuclear weapons are, relatively speaking, not inaccurate. Apathy about nuclear warfare and failure to draw appropriate political conclusions are not the result of mere ignorance of weapons technology.

Furthermore, at least one value conducive to arms control exists in the public, the desire for peace. But, the presence in the public of such facts and such values does not determine what operational implications the public will draw. A further ingredient needed before public opinion will emerge as a significant force for arms control is leadership. On operational conclusions from the existing information, public opinion is amorphous, inchoate, ready to be led. But it will not be led by words alone. The public is not to be had for the asking or the ordering. It will draw its own conclusions consonant with the behavioral models offered it by those whom it respects.

Influencing Opinion from Abroad

The implication of this discussion is that neither leader nor led is free in relation to the other. They are coupled parts of an interacting system. The leader who would shape opinion is constrained to behave in appropriate ways. And when he has succeeded in creating opinions he limits his further freedom to change. What he has led the public to believe in, the public will demand. A Churchill-like stand destroys support for seeking compromise or an Eisenhower-like stand makes it hard to ask sacrifices. He who would shape public opinion must give hostages to it.

And so it follows, if we look at opinion and leadership as a coupled system, that the goal of foreign propaganda is to act on the system, not on either of its halves alone. Propaganda efforts for arms control can, indeed, help to bend the course of nations and to make control more feasible. The main purpose of such a propaganda effort is not to sell disarmament to the public but rather to commit the propagandizing governments themselves to the scheme for control and to make it more difficult for them to cheat.

Let us illustrate by reference to the effects of propaganda in quite a different recent situation: the American exhibition in Moscow.[8] The exhibit portrayed the consumer goods available to the American people. The Soviet propagandists felt constrained to reply. Soviet citizens, they said, have the same things, and to underscore the point they opened their own exhibition of Soviet cars, television sets, housing, etc., at the entrance gate to the American exhibit. To compete in the propaganda field, the regime itself became a perhaps unwilling agent of liberalization. Its propaganda sanctioned the demand of the Soviet public for more and better consumer goods and added to whatever pressures are put on Soviet military production by the people's urge for better living.

The planned purpose of the American exhibit, to convey an image of the American way of life, was of secondary importance in and of itself. What difference does it make how Russians visualize the daily life of an alien tribe dwelling 6000 miles away? But the portrayal became by indirection a powerful political instrument, for it forced Soviet domestic propaganda into that branch of the Soviet line more advantageous to American interests, at least temporarily.

This example is not an odd, special case of propaganda trickery. It illustrates a mode in which international efforts to influence public opinion typically function. It is seldom that foreign propaganda operates to any great extent directly upon a people. There are circumstances in which it may, as when a revolutionary underground awaits word from outside. But the usual mode of impact of foreign propaganda is that a small volume of external communications serve as a catalyst to a specific and large flow of domestic messages. Commonly the catalyst works in the manner just illustrated; fear of loss in a propaganda battle compels a regime to commit itself in ways or to degrees which it would not otherwise consider.

Do Public Opinion and Propaganda Affect Arms Control?

But, it may fairly be asked, does it matter what a regime tells the public about arms control? Do public statements affect what diplomats may eventually achieve by way of agreement? And in particular does it matter in action what a totalitarian regime tells its people in propaganda?

The relevance of propaganda and attitudes to arms control has been underlined recently by the discussion of what is called, in Lewis Bohn's phrase, psychological inspection. A valid point in this discussion is that no inspection scheme is likely to succeed in the face of a unitedly hostile populace, set to deceive the inspectors and to protect their own government, whether it was cheating or not. Guerrilla warfare teaches a parallel lesson. Even a small conspiratorial minority cannot be suppressed when the populace favors them and will hide them in its midst. But guerrillas cannot survive if they cannot rely on at least passive support of the populace.

The analogy to arms inspection holds. A cabal of cheaters (officially sanctioned or not) preparing a massive enough scheme for nuclear triumph would necessarily engage large numbers of persons in untoward activities which would come to the attention of even larger numbers of persons. This kind of cheating may work among a supportive population, antipathetic toward inspecting agencies. But every step which increases the probability that some individual or individuals will identify with the inspectors instead of with their government and will expose illicit activity makes such cheating harder and riskier.

Propaganda in support of the inspectors is such a step. The propaganda which will make cheating hardest is propaganda in which a nation's own top officials repeatedly tell their people that it is their duty to cooperate with an arms-control and inspection system. If Mr. Khrushchev or his successor, in accordance with an international agreement, periodically lectured the Soviet people on their duty to open their portals to inspection for peace, if the Soviet law and the Party congress resolutions formally enunciated this obligation, it would become substantially harder to organize safe contrary activities even through the abundant covert channels of the secret police, army, and party. Not every *apparatchik* and technician would understand that the sacred words were to be taken as mere window dressing.

Of course, that image of future developments is fantastic. Like many arms-control ideas, there is no immediate prospect of agreement to a plan as far-reaching as those we have mentioned. We have described admittedly extreme measures, but they are of interest because they are not all-or-none proposals. Partial steps, either by competitive propaganda or by international agreement, toward repeatedly and publicly proclaimed commitment to the legitimacy of inspection and toward full and fair cooperation with the inspectors, makes the successful hiding of violations less manageable. Conversely, a regime which protects its power to cheat by using propaganda to isolate or alienate its people from the agents of inspection casts doubts upon its true acceptance of controls and may cause others to back away from agreements and concessions. Thus, the Soviets, to gain the advantages which disarmament has for them, are under pressure to use their instruments of public persuasion in ways which lend support to systems of control. It is not easy for them to conduct an effective worldwide campaign for disarmament without thereby popularizing the idea in the Soviet Union too. And it is hard for them to go far in the direction of creating public support for disarmament without accepting the risks of popular support for effective controls. To some extent they may become prisoners of their own propaganda. Arms-control schemes can be designed to maximize that possibility.

Cases of Entrapment by Propaganda

What we are proposing is not an innovation without precedent. On the contrary, national policies are constantly being entrapped by the demands of competitive propaganda. American policy has been forced by the demands of competitive propaganda to accept, at least tacitly, two themes of dubious value from our point of view, namely, peaceful coexistence and disarmament as distinct from arms control.

"Peaceful coexistence" as distinct from, say, "peaceful nonintervention" implies acceptance of Soviet domination in their Bloc. The duality of the coexistence image says in effect that not 50 or 80 nations may each peacefully choose its course, but that each of two systems may. That is a subtle redefinition of what constitutes the preservation of peace and what constitutes aggression, which, because of its propagandistic skillfulness, our side has not been able to reject.

Similarly, we have become bemused by the notion of disarmament as an economy measure. The abolition of nuclear warfare is far too important an objective to be entangled in matters of economy. The preservation of mankind is worthwhile even if it costs more than the present arms race—and it possibly will. The manning of an effective arms-control scheme may require a professional "unarmed service" comparable in size to a small armed service and expensively equipped. Such a service may require persons of high professional competence who will live under unpleasant circumstances in remote parts of the world, and who will have to be compensated accordingly. Add to that the cost of maintaining a secure second-strike capability, preferably in the hands of an international agency, to deter sneak attacks. Add to all that the cost of whatever policing (international or other) against limited war is necessary. Then the danger of small wars would probably grow if the deterring fear of starting a nuclear holocaust out of a small fracas were eliminated. Clearly, effective arms control may cost a great deal.

From the Soviet point of view such a costly arms-control effort would be partly self-defeating, for among their major objectives is to relieve themselves of the strain of armament spending. We, however, are rich enough wholly to subordinate our economy to the goal of security for mankind. An expansive though effective system of arms control would be desirable for us.

But public opinion has not been brought to this awareness. Appeals for arms reduction with the implication of economy have produced a public response in this country which imposes limitations upon our diplomacy. We have tended to accept a definition of arms limitation (proffered by the Russians, among others) in which it is assumed that banning of weapons is part of a complex including mutual trust, reduced tensions, reduced military expenses and reduced military activity. And, conversely, if hostility and tensions grow then arms tend to become unlimited and military budgets and activities increase.

From a security point of view this is nonsense. If tensions and differences were sufficiently relieved, perhaps we could survive without abolishing nuclear weapons, but if the bipolar conflict remains sharp, and wars remain probable events, then national survival will require the elimination of the large-scale use of the most dangerous weapons so as to permit the battling out of national differences without incurring the risks of total war. Or to put the same point differently: if by some miracle we and the Soviets were to mutually abolish our nuclear weapons, far from necessarily entering an era of good feeling, we might find ourselves having to increase our military effort to a fantastic degree so as to be able to deter Soviet invasion of, for example, Iran or Berlin with conventional weapons. In the absence of a nuclear danger, some checks to localized military action would be gone, and we might have to prepare for increased warfare even if we had regained the marvelous security, that in our time there would be no nuclear war.

While it is thus clear that abolition of certain weapons is not in any logical sense necessarily a part of reduction of tensions or of arms spending, these things are associated as one in the mind of the public. In public opinion the urge for disarmament arises from attitudes essentially antithetic to the burdens and processes of international politics. Disarmament is seen as an alternative to a responsible foreign policy. It is seen as an escape from the burdens of a national security effort. To those who find distasteful the nasty, tough, expensive processes of using national power for national objectives, disarmament presents itself as a pleasant alternative. It offers itself as a way in which we can with apparent impunity start behaving as liberal godly gentlemen, not only within the in-group of an organized society, but to all humanity. And at the same time it promises a release of resources for more civilized purposes than arms.

But the effort to achieve disarmament on such an irresponsible business-as-usual or moralistic basis is self-defeating, for in the end a nation will not thus risk its survival. Disarmament, if it is to be achieved at all, requires that at each step of the way each side have adequate assurances of military security. Abolition of particular weapons needs to be but part of a coherent security policy of which other parts include defense spending, military alliances, diplomacy, inspection, etc. Disarmament is a proper part of such a military security policy, for no nation can be secure in a world in which modern weapons are uncontrolled.

As long as the public is not made aware of this view of arms control, as long as disarmament is the slogan of those who would shuffle off the burdens of national security policy, and is correspondingly opposed by those who make our defense plans, it is hard for a democratic government to deal with disarmament realistically. The government is caught in the middle. On the one hand, the military become a pressure group against arms-control measures when the military should as part of their job be seeking those controls which maximize national security. On the other hand, to the extent that the government accepts disarmament defined as relaxation of defense, it undermines its ability to demand effort and sacrifice from the public for it is signalling to the public a condition of normalcy.

None of these things need be. Arms control could have been defined by the President as an arduous and expensive, but necessary security measure, and the public would have responded accordingly. But in the propaganda battle we were seduced into accepting a Soviet definition of the issue. We reject the Soviet proposals, but we discuss them in the same terms as they were offered: reducing tensions and reducing the arms burden.

Public Opinion in the Soviet Union

The reader may appreciate that a democratic government can be hamstrung by public opinion, but may doubt that this limitation also applies to the Kremlin. The usual view, that in Russia public opinion is nothing, has a superficial plausibility based on the fact—of course true—that the Kremlin elite does not share our ideology that the government should follow the desires of its public. They view public opinion as a force, and a dangerous force, to be taken carefully into account and manipulated. That is neither a democratic view, nor one of indifference or disregard. The dangerous force may be taken into account by brutal suppression, which is how public opinion against rural collectivization was handled. It may be taken into account by creating diversions or by camouflage. But to assume that such devices attest to an absence of interaction between public opinion and policy decision is to underrate seriously the role of public opinion in a totalitarian society.

Soviet leaders have always received detailed police reports on the state of opinion. More recently public opinion polls of a sort have been started in Russia. Evidence of sharp sensitivity even to minor waves of feeling is abundant. For brevity we note here but two points of evidence: (1) the attention paid by totalitarian regimes to molding public opinion; (2) the impact of Western cultural movements within Russia. The iron curtain is a porous one.

There is in Russia a vast press and radio network every word of which is carefully weighed, for Soviet *public* propaganda is a form of esoteric communication. *Pravda* articles are directives. They are not just noise irrelevant to a more important confidential communication system. On the contrary, what the public is told is treated as of vital importance. The struggles within the Soviet elite are largely carried out in terms of controversy about what criticism or praise of whom is to be allowed into the public press. When Lenin died the struggle was on his so-called testament; whether it would be acknowledged and published, and if so in which bowdlerized version. Khrushchev's struggle for power centered at one stage on how his title as first secretary of the Party should be printed—capitalized or not. The great purge trials of the 1930's were but an extreme form of the Soviet pattern of political struggle by public allocation of praise and blame. Clearly any action which can influence what statements the Soviet regime makes in public places has, in such a communication system, very great importance indeed.

The fact that public opinion is important in Russia, at least in that the regime behaves as if it is, is not enough to show that it can be manipulated by foreigners. But in fact totalitarian controls do not suffice to isolate Soviet thought from major concepts circulating in the world or from major news events.[4] Word-of-mouth channels are so effective that, for example, when Soviet defectors became disillusioned with their treatment at Western hands and returned in moderate numbers, the Soviet mass media did not publicize their complaints. The Soviet authorities realized that conversational reports would get around and would be accepted as more reliable than claims in the Soviet press. Also the elite are themselves a significant chink in the Soviet wall against foreign concepts. Those Soviet officials who travel, those who read foreign publications or monitor reports are deeply imbued with the notion of emulating and surpassing the West, but that implies following a path which has been defined by the West. The regime fails in its attempts to keep out interest in jazz, lipstick, TV, or French Impressionism. Political ideas of freedom continue to penetrate the Soviet wall and create sporadic ferment and dissent. The existence of such ideas becomes a fact of public opinion to which the Soviet regime does respond in some form even if only that of attack.

A Propaganda Program for Arms Control

Among the propaganda options open to us, there are some which may make a difference to arms control. Specifically, propaganda devices may be among those used:

(1) to open up Soviet society;

(2) to add to the technical difficulties of surprise attack or arms-control violations;

(3) to influence the internal political balance in the Soviet Union against elements with more strongly expansionist or dogmatic programs;

(4) to reduce the chances of crises arising from miscalculation and ignorance of the facts;

(5) to increase awareness of the disastrous consequences of nuclear warfare;

(6) to increase awareness of the risks attendant on limited military actions; and,

(7) to increase awareness of attractive opportunities for growth and success with arms limited and war prevented.

Of all these objectives, perhaps most important is the opening of Soviet society. True, there are dilemmas even about that goal, for the exposure of *defensive* weapons by penetrating their secrecy may make a nation less secure and thus be de-stabilizing. But what we fear from the Soviet Union is an *offensive* capability arising from secrecy which an open society would not have. As long as a great power retains such secrecy, long-term successful arms control is not conceivable. So, for arms control to succeed, secrecy among nations must become disreputable. A public opinion must arise, and be disseminated to the Soviet Union, one which accepts the equation, secrecy equals war, openness equals peace.

There is an inherent logic in our demand for inspection. By strongly posing the issue of inspection to provide security against surprise attack and by keeping discussion of that issue going in the world over a period of years, we would be able to make it a recognized consideration in internal Soviet opinion. The Soviet regime may not share our conclusions, but they will have to respond not only to our demands at the bargaining table, but also to an awareness of the force of these demands among themselves. They will in short have to find a debater's "answer" and incorporate it into their line. To that extent their strategic freedom is constrained.

Western strategy can be designed to compel the Soviet propagandists to deny to their people that the Soviet Union is a closed society enveloped in secrecy. Every pontifical statement by Soviet propagandists that there is no iron curtain, that they welcome visitors to see whatever they wish to see, that they do not prevent contact beween their people and the West, and that the blame for closed areas and restricted travel is America's, is a triumph for liberalization and for those seeking effective arms control. Every statement, such as those following the U-2 incident, reaffirming the right to secrecy, condemning access as espionage, and hardening the defense of a closed society is a setback. To the extent that the Soviets deny that they are a closed society, they accept grounds for debate and magnify issues not of their choosing, which are favorable to realistic arms-control negotiations.

Likewise, it would be helpful if the Soviet leadership were repeatedly to assert publicly that nuclear warfare is suicide and that they would never launch a nuclear strike first. Clearly, such public statements could coexist (as they do) with a relatively covert military doctrine justifying a pre-emptive strike. Public promises are not assurance against deception. In nuclear warfare indeed the advantages are so loaded on the side of prevarication that an aggressor would hardly be inhibited by the consideration that world opinion (whatever was left of it) would realize that he had lied. This, in short, is about as hard a case as there is in which to demonstrate that public propaganda commitments make a difference. Yet, even in this instance, repeated public statements have a constraining effect.

They do several things. They make it more difficult to use nuclear blackmail in limited conflict situations because of the domestic anxiety which the threat to drop even one bomb on an enemy base might engender in a public thus indoctrinated. They strengthen the hand of those factions in the Soviet internal debate on nuclear policy who have concluded that nuclear strategy is a futile and dangerous game. (Such a debate has taken place in Russia.) And finally, such statements may even raise the complexity and expense of the communication and control system needed by the Soviets to assure themselves that a first strike would work with such certainty as to relieve them from anxiety about retaliation by residual forces. A simple attack system relies upon large numbers of human beings understanding and obeying orders in the myriad operations involved in getting a massive firing off the ground. If any substantial number of these persons have been affected by solemn public propaganda as to how inconceivable it would be for their side to launch a war, there may well be critical failures to understand or carry out orders at a number of key places. (Studies have shown that a high proportion of soldiers either do not fire or do not aim to kill when ordered to fire in battle.) One way to reduce such failures of understanding or morale is to whip up war fever in advance, but to do so is to surrender the advantage of being able to launch an attack that is a complete surprise. A launching system that would work at any moment despite opposition by a large element in the population to the launching of a first strike would have to use extremely centralized electronic controls and would therefore need a high degree of mechanical reliability. Setting up such a system would be both difficult and expensive.

So there are good reasons for desiring the Soviet leadership to tell their own people (as our leaders tell us) that their purposes are peaceful and that they would not use their nuclear weapons in a first strike. The desire for peace by the Soviet people is unquestionably a genuine grass-roots feeling. The Soviet rulers have tried to capitalize on it by repeatedly presenting themselves as peace-loving and as far as we can tell this element of their domestic propaganda has been a success. The peaceful intentions of the regime are apparently believed in. But even if a success, this propaganda is a constraint on the Soviet rulers. They are reinforcing the somewhat unsophisticated pacifism of their populace and thereby slightly limiting their own alternatives.

There are still other ways in which propaganda addressed to the public may facilitate the functioning of an arms-control scheme. One way is to humanize the enemy and to make a more differentiated image of him. Let us consider how the character of the images of foreign nations may affect strategic reasoning.

Any sane strategist views nuclear warfare as a last resort, if it is a resort at all. As long as there seem to be possibilities for influencing the course of enemy action, nuclear warfare will not seem attractive. Note, for example, the debate in the United States a decade ago about preventive war. The case *for* preventive war was that the military balance of power would turn increasingly against us, and it has. The case *against* rested upon the belief that Stalinist oppression instead of getting worse and worse until an intolerable 1984 would give way either to revolution, or, as has begun to happen, the creation of a new bourgeoisie and the decay of the spirit of the revolution. Prospects of change from within made war an unattractive alternative. Only the view of Russia as blackness becoming blacker made war seem reasonable at all.

A second illustration is offered by the problem of nuclear weapons in half-friendly theatres. If we think of the satellites as Communist countries we might use nuclear weapons in fighting over their territory, but if we think of them as allies to be liberated, we hardly could. Few of them would survive such liberation.

In short, the more pinpointed the enemy, the more restricted the targets, the more sense arms limitations make even to military planners. This applies to Soviet planners too. A Europe containing strong Communist movements serving as fifth columns would be a target for which weapons of highly limited destructive potential would make more sense for the Soviets than a solidly anti-Communist Europe. For Americans this sobering thought may be no reason for wanting Communists strong in Europe, though it might be a good reason to keep the Soviets adequately aware of the opportunities conceivably available there for the Left.

In Europe, in fact, the Communist prospects do not seem good enough for the Communists to take them very seriously. In Asia, however, they do, and it is clear that Soviet manners and the course of Soviet conduct are modified by a desire to bolster potential supporters who are recognized as significant forces in the population.

As a general matter, the more complex the image of the target, and the more aware the planner is of the possibilities of maneuver within the enemy sphere of influence, the less useful will unselective weapons of mass destruction seem. This is significant, for complexity of image is one aspect of public opinion which we do know how to influence. The evidence is strong that intercultural contact leads to increased differentiation of images. It does not always lead to friendship or liking. It may do the opposite. But it almost invariably leads to increased awareness of the complexity of individual and group characteristics. For this reason, East-West cultural exchanges are probably a powerful force favoring the prospect of ultimate arms-control agreements. Without necessarily increasing friendship, they may increase consciousness on both sides of the possibilities of subtle manipulations of the potential enemy's course of action as alternatives to such blunt concepts as massive retaliation.

One of the outcomes that may be most hoped for from the presence of arms inspectors in potential enemy territory is that they will provide more intimate and complicated interactions with the populace of the observed society than do present exchange missions. We should be concerned to avoid the isolation of the inspectors. For the long run progress of effective arms control, it is desirable that they be in as intimate contact as possible with the society in which they are stationed. It is often maintained that the Soviet regime could easily isolate inspectors. It could indeed isolate them, but not easily. It could do so only by a kind of terror which would prove once more to the Soviet people that their government does not trust them.

In the absence of vigorous terror the probability of Soviet citizen co-operation with foreign inspectors is at least as great if not greater than it would be in a free country. Alienation of the people from the regime has ever been a price of totalitarian control. The unrelieved din of propaganda for loyalty not only fails to stem it but is one of its sources. Alienation, it must be understood, is not lack of patriotism. It is distrust of the authorities and failure to identify with them; it is quite compatible with love of country. Those Russians who stuff unsigned notes into the hands of visitors, who criticize freely or are silent, depending on whether a third person is around, who talk of the government as "they," not "we," are not unpatriotic. They love their country and they also love peace with an emotional fervor at least as great as that of any other people. The evidence is that they also believe in "socialism."[5] But neither socialism, fatherland, nor peace is seen by alienated Russians, of whom there are many, as the same as that gang in the Party and government to whom they must adjust if they are to get along. True, a totalitarian regime has many weapons for intimidating the alienated and for creating facades in public affairs. But any inspection device which opened up the possibilities of confidential contact between foreigners and alienated Russians would tap a great and vigorous stream of rumors, gripes, and disaffection which flows close beneath the surface of a totalitarian regime.

For that reason the Kremlin may be expected initially to reject free contact even though they have already admitted the principle of inspection. For the immediate future they will continue to label the free search for knowledge as espionage and for friendship as subversion. But we have the chance, by way of Soviet opinion, to make this an uncomfortable position to maintain. We can create an appealing ideology of the inalienable rights of friendship, of free movement, of an open world with open skies. If we conduct ourselves in ways which make the message meaningful, we may in time influence the coupled system of the Kremlin and Russian public opinion; we may move them by halting and partial steps of counterpropaganda toward practices which will enable us to know better whether arms controls are being observed. And this course will make it more probable that they are observed.

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WILLIAM T. R. FOX

Political and Diplomatic Prerequisites of Arms Control

Arms Control and Today's World

ADLAI STEVENSON has said that the American government in its arms-control negotiations has too seldom asked, "Why not?" and has too often said, "Yes, but . . . ." One main section of this paper may be described as the "Why not" part, the other as the "Yes, but . . ." part. To find the limits of the politically feasible, one must deal with both. It is a truism to say that only those arms-control agreements are feasible in which each of the parties calculates that it gains more than it loses by entering into it, and loses more than it gains by leaving it.

We ask what feasibility means in a bipolar world. Thus, a proposal must command both Soviet and American assent if it is to be feasible. This is a world in which the most advanced weapons take a long time to be produced, but a short time to be used. Decisive events in a new war may occur in the very first hours; whatever the national preparedness, whatever the coalition, still military planning is necessary to cope with violations of arms control, and must be kept in readiness. This is a world in which such stability as there is seems to rest upon a balance of terror whose sway must not be weakened until a reliable substitute has been established.

Nor is retaliatory atomic power the only form of military power that states today insist upon keeping. There is a host of unresolved disputes which, given Soviet and Western reluctance to embark on two-way thermonuclear war, make the capability for limited war an invaluable political asset. Divided Germany, divided Korea, and divided Indochina are only the most dramatic examples of areas where an uneasy equilibrium of military and political power supports the possibly temporary solutions of today. "Complete and general" disarmament will certainly not precede the easing of a number of these disputes.

The climate of contemporary world politics is rigorous, and only the hardiest arms-control organisms have a chance of surviving. The political weather is on occasion still more forbidding, as during the period following the U-2 incident. When we discuss feasibility, however, we shall be talking about climate, not weather; one can always wait for weather to change.

There is no simple answer to the question, "Is arms control feasible?" There is a bewildering variety of proposals for test bans, "open skies," the systematic exchange of information, ground inspection, the stoppage of production of fissionable materials, the disassembly of weapons, the surrender of stockpiles, the liquidation of foreign bases, the establishment of zones of disengagement, the destruction of guided-missile delivery systems—and all these proposals are being advanced in an almost infinite number of combinations and sequences. The feasibility of each set of proposals has to be evaluated separately, including those proposals not yet made—a task far beyond the scope of this study.

One can, however, describe the common, or at least apparently compatible, interests which are bringing the governments of the great states to view arms control as an area for major decisions on policy. One can specify some of the conditions which, if met, make agreement more probable. These two exercises do not lead to any detailed conclusions about arms control in general, but they are prerequisites to the evaluation of any particular plan for control.

Political Pressures for Arms Control

Great states do not easily accept controls over their armed forces. What are some of the pressures in this third quarter of the twentieth century that are driving them to concert together in establishing such controls?

Public Health and World Opinion. One pressure is simple and specific: the concern for public health, or at any rate, for the good opinion of those who are concerned for public health, a concern to halt at least those atomic-weapons tests that pollute the atmosphere.[1] The outcry from the Afro-Asian nations following the two French test explosions of the early months of 1960 is only the latest evidence that a concern for world opinion as well as for public health will make it difficult for test-ban negotiations to be broken off, and for testing above ground to be resumed by the initial three atomic powers. Even if these three have no further urgent military requirements for above-ground tests, the testing programs of France and other countries, as they in turn achieve nuclear capabilities, would, in the absence of agreement to cease above-ground testing, progressively pollute the atmosphere. Thus there is a nonmilitary "Nth country" problem in addition to the more commonly discussed military one. The public-health consideration does not apply directly to underground tests, although a deadlock over underground tests may be used to frustrate agreement on ceasing other tests. Much of world opinion may then hold responsible the side which is apparently the more intransigent on underground inspection.

The Avoidance of Thermonuclear War. The voluntary moratorium on atomic-weapons tests during the period of test-ban negotiations has met the immediate demands of those concerned with health and genetic hazards. Attention has since been directed more toward measures of arms control to reduce the chance of thermonuclear war. The "environment of stability,"[2] a polite name under present conditions for the balance of terror, can perhaps be made more stable by such controls. There are three contingencies whose probability might be reduced by the regulation of atomic arms: surprise attack, accidental war and catalytic war.

The fear of a surprise attack is by no means unique to the Western nations.[3] However, proposals to reduce this fear have had a higher priority in the West than in the Soviet Union.[4] Thus, the Western side's proposal, submitted to the Ten-Nation Conference that opened 15 March 1960, called for the prior notification of space launchings and "the prohibition against placing into orbit or stationing in outer space of vehicles capable of mass destruction." Here then is one kind of shared anxiety which might be alleviated by specific and detailed agreements.

A second influence is the threat of accidental war. It might arise from a misreading of the prospective enemy's intentions under technological conditions which leave no adequate time for reaction—no time for checking ambiguous radar reports, no time to permit a disavowal of an unauthorized or accidental atomic explosion. "Open skies" proposals and other plans for inspection and disclosure which give some assurance against surprise attack also permit the time for reaction to be increased. Thus they give an increased opportunity for avoiding the accidental war that neither side wants. So would adequately inspected schemes that limit the dispersion of atomic weapons and the power to authorize their use—whether the dispersal results from the deployment of atomic weapons in installations abroad by existing nuclear powers, or from the spread of nuclear capabilities to additional powers, the so-called "Nth country" problem.

It is not clear whether a Soviet-American arms-control agreement will influence the decision of either the United States or the Soviet Union to withhold help from France in acquiring atomic weapons or the decision of the Soviet Union to withhold help from the Chinese People's Republic; nor is it certain that such an agreement would weaken the determination of France and the Peiping regime to acquire independent nuclear capability, even if help is withheld. On the other hand, if the United States and the Soviet Union both desire (agreement or no agreement) to halt or to slow down the spread of nuclear capabilities, even to their own allies, then the prospects for agreement may be enhanced, and the chance of preventing the further spread to smaller allies and uncommitted powers would be greatly increased. The Chinese case, however, may be special. The price of Chinese adhesion to such an agreement may be high.[5] Without Chinese participation, a test ban would be meaningless. Furthermore, it is not clear that Peiping would need to test weapons to gain the political advantage of an alleged possession of nuclear arms.

The third contingency is a war between two major nuclear powers brought about by the calculated act of a third power—the so-called catalytic war.[6] In a sense, World War I was such a catalytic war. Austria-Hungary's intransigent demands, ambiguity about commitments to alliances, ignorance on the part of the European great powers of one another's intentions, short reaction times open to governments in an era of split-second railroad mobilization timetables, when a few hours' delay was thought to be irretrievably disastrous—all these helped to transform a Balkan crisis into a world-wide conflagration.

The time may be remote when any present non-nuclear power, even in the absence of arms control, will develop a first-strike atomic-weapons and missile-delivery capability. The French case, though it underlines the difficulty of preventing an advanced industrial country from developing some independent atomic capability, also illustrates the tremendous gap that separates American and Soviet capabilities from those of France. There are not many powers that could match even the French effort.

Yet, a power with some diabolical interest in a war between the first-ranking powers of today might require a far smaller nuclear capability in order to bring about catalytic war than it would to make a successful first strike on its own part. Two kinds of international agreement might promote the common interest of the Soviet Union and the major Western powers in avoiding this catalytic war. Agreements on international inspection and the exchange of information could increase the capacity of each nation to distinguish between surprise attack and a perfidious effort to bring about a catalytic war. Concerted Soviet-Western action—by test-ban agreements, by agreements not to sell or give away atomic weapons, by agreements to provide for a close supervision by an international agency of power reactors, ostensibly for peaceful purposes only, and even, perhaps, by agreements to bring economic pressure on non-cooperating states—would check the spread of atomic-weapons capabilities. The signatories might thus avoid the necessity of having to distinguish between a surprise attack and an attempt to provoke a catalytic war.

Supplementary Pressures for Arms Control. A concern for public health and the fear of an avoidable nuclear war create pressures for arms-control negotiations. Two other pressures could strengthen any existing determination to work toward arms-control agreements. One is the desire for relief from the crushing economic burden of an increasingly costly defense mobilization. Both tax fatigue and mass demands for higher living standards may call for a negotiated reduction in arms levels.

The second is the widely held belief after years of the cold war that, like Ford and General Motors, the United States and the Soviet Union are each too big to destroy the other without destroying themselves. Success in arms-control negotiations may provide the opportunity "to make a new beginning." Perhaps it is not necessary that the two sides should agree as to whether they are beginning a progressive relaxation of tensions, or a start toward comprehensive arms controls or both. Men have always found it easier to unite in an immediate action against a specific and identifiable evil, such as Adolf Hitler or "dirty" weapons tests, than to unite for some benign overriding goal.[7] Whether an agreement in such a narrow area as the cessation of atomic-weapons tests would naturally and easily lead to broader and more fundamental agreements need not concern us. It is the hope, the expectation, not the actuality, that counts. So much for a catalog of the various interests that may (or may not) be driving the major powers toward arms-control agreements.

Conditions Favoring Arms-Control Agreements

However urgent and inescapable arms control may appear to the leaders of the great states, there is no guarantee that an all-round sense of urgency will be translated into a detailed working and expanding system of controls. What are some of the conditions essential to, or favorable to, the development of a system of controls?

Some Apparent Obstacles. Some of those who argue against any form of arms control whatever fail to distinguish between the obstacles to and the conditions of agreement. Many apparently large and imposing obstacles, however, do define the essential conditions.

For example, it is urged that we cannot trust the Russians. "Trust," as that word is used to describe an alleged prerequisite to cooperative or contractual relations, hardly operates at all between the first-ranking states of our era. In the efforts of their political leaders to substitute a security based upon an agreed arms control for a totally anarchic arms competition, it is the lack of trust which drives them to bargain so closely and prevents them from moving toward agreement except by hesitant and short forward steps.

Given this mistrust, we see that the observance of arms-control schemes, whether comprehensive or limited in scope, cannot depend on self-inspection and the honor system. If trust is to be established in this area of relations between the Soviet and the non-Soviet worlds, it will be a consequence, and not a condition, of arms control.

It is also urged that one can never have an adequate assurance that an arms-control scheme will work; for example, even a perfect scheme for monitoring the future production of atomic materials gives no assurance regarding hidden or undeclared stockpiles. A variant of the argument that adequate assurance is impossible is the assertion that any half-way house on the road to a comprehensive and general disarmament is fraught with danger. Our side, it is argued, should not in the poker game of world politics give up or jeopardize the free use of its winning or deterring ace so long as there are any wild deuces in the hands of the other players; like the other players, we are playing "for keeps," and not merely to win the game. It is no good, it is said, to control atomic bombs unless there are simultaneous controls of all weapons of mass destruction—chemical, bacteriological and radiological. Also, it is asserted, a scheme which does not establish a world arms-control authority, unfettered by a great-power veto, and with overwhelming force at its disposal to assure "swift and condign punishment," can only breed a false sense of security.

So long as "complete and general" disarmament is beyond reach, the view that adequate assurance is impossible and the view that no half-way house can offer adequate assurance have an identical operational significance. Both views seem to overlook the fact that the exclusive dependence for security on the military strength of one's own side has its risks, too, and that arms control is but one method among many for promoting security in an insecure world. A new scheme would not be applied in a vacuum. It would be injected into a working system which, whether inefficiently or efficiently, is providing some security. The question about any particular scheme is, as D. G. Brennan has demonstrated,[8] whether it would "reduce present risks by more than the amount of new risk introduced by the control program." Because the risks of any new and untried scheme are harder to calculate than the risks of the system it is to replace, the calculation of risk is probably biased against change, if only slightly. However, there is no inherent reason why a comprehensive plan for control is less risky than a specialized one, or one of limited scope more risky than none at all. It is a matter of political judgment, to be determined case by case, and only after calculating the combined effect of arms control and all the other security-promoting devices, to determine in which direction lies the lesser risk.[9]

Trust, absolute assurance, and comprehensiveness are not necessarily requirements for a plan for arms control. They are not prerequisites to, nor are they a substitute for, the one overriding requirement of any feasible scheme: that each indispensable participant, using its own calculus, calculate that it gains more than it yields by entering and remaining within a system of control.

The Requirement of Agreement in Detail. This calculation, however, cannot finally be made except with regard to an extremely detailed set of proposals. Such proposals can result only from negotiations among governments which are organized to produce an authoritative negotiating position, governments which are making a genuine diplomatic effort to discover areas of agreement (or disagreement) and which persist until the actions that are being regulated, as well as the measures for the detection of an evasion and the identification of the evader, are unambiguously defined.

The difficulties of developing an authoritative bargaining position are much greater for the West than for the other side. They include: the problem of executive-legislative coordination under the American system of separation of powers; the absence of a strong central organ in Washington for coordinating the great quasi-sovereignties on the two sides of the Potomac that make up the executive branch of the government; the temptation in several Western countries to consider the negotiating position of a specific country in relation to the re-election prospects of its government of the day; a public opinion in all the Western countries which cannot for long be ignored, and a free coalition, each of whose governments must be independently persuaded that the common negotiating position is the closest practicable approximation to the position it would have taken independently. Contrast this with the problem of a highly centralized, highly integrated authoritarian government with wholly adequate instruments for managing domestic opinion and, during the present phase of negotiations, with no allies free to develop divergent negotiating positions. The flexibility in negotiating which is thus open to the tightly organized side compounds the problem, for frequent shifts in the tactics of negotiation place a tremendous strain on the capacity of the loosely organized side to coordinate its diplomacy.

In order to develop an authoritative bargaining position, it is not enough for the governments representing the so-called open societies to determine what the "right" arms-control policy is. They have the separate task of calculating whether that "right" policy is domestically feasible. Whenever elites that influence opinion are uninformed and unconcerned, or misinformed and very concerned, important opportunities for negotiating may be missed. What a government representing an open society needs is a public in which at least some of its elements are sophisticated enough and concerned enough to offer discriminating and conditional support. Only then are its leaders free to concentrate on choosing the policy position on arms control which is "right," in terms of realizing to the maximum objectives of that country's foreign policy.

Given a domestically feasible and authoritatively based position for negotiation, it then becomes possible for the actual negotiators to perform their essential function, "to find a firm basis for agreement or disagreement, as the case may be." The function of the diplomatist is well illustrated by the sharp contrast between the two disarmament conferences of the first six months of 1960: the Geneva test-ban negotiations, and the Ten-Nation Disarmament Conference. The protracted, minutely studied, and hard-fought bargaining over the cessation of bomb tests must be counted a success, whatever the outcome. The negotiators will have done their job when they establish whether the goals to be forwarded by negotiation are better served by agreement or by delay until a more propitious time.

By June 1960 the Ten-Nation Conference carried on at the same time and in the same building in Geneva had not matured from the stage of propagandistic skirmishes for the favor of some elements of non-Soviet world opinion to a serious effort on both sides to define precisely the areas of agreement and disagreement. A comparison of these two conferences demonstrates that one of the prerequisites of successful arms-control negotiations is that the diplomatist concentrate his efforts on his proper diplomatic task. Let us elaborate this point.

There are two kinds of behavior which jeopardize success in negotiations. One is an excessive concern with short-run considerations involving world opinion. Serious diplomatic efforts ordinarily require the elaboration of detailed and complex proposals, while grandstand appeals to world opinion are most effective when they are simple and unqualified. Thus, the virtue of the "sincere" government may for a time go unrewarded.

Equally destructive of the diplomatist's objective is an excessive concern with the short-run impact on the domestic political process of the diplomatist's own country. If either an agreement or a disagreement is regarded as essential to the maintenance of a government's position at home, the negotiations are a fraud—at best, meaningless, and at worst, dangerous.

The discovery of a firm basis for agreement, or disagreement, as the case may be, can occur only between diplomatists with an adequate and approximately equal knowledge of the technical data that is most relevant to the matter under negotiation. The absence of such an equality of knowledge may in itself be sufficient to explain the failure of negotiations for the control of atomic energy in the early postwar years. Not only was the Soviet government suspicious lest its more knowledgeable opponents be playing some trick, but it also did not wish to be locked into a control system which would have made its relative ignorance and inexperience permanent. In the case of the test-ban negotiations, detailed knowledge is being shared, but new data are constantly being fed into the negotiations, particularly in relation to the "big hole" problem, that is, the problem of detecting deliberately muffled underground tests. So long as either side believes that important information which might alter its position is on the point of becoming available, it will delay any formal agreement.

The same problem points to another aspect of the general requirement. The scope of the agreement should be precisely limited to the regulation of "suspicious events" whose occurrence can be unambiguously defined. There can be no grey zones of inspection, that is, no class of definitely established events which are clearly neither illegal nor permitted. Although the veto need not be surrendered with respect to an action for enforcement,[10] the inspecting agency's freedom to follow up suspicious events and to do a certain amount of random checking, even in the absence of such events, must be precisely spelled out and demonstrably adequate.[11]

There has been agreement in principle as to the desirability of a test ban, but, as the gap between the Soviet and Western positions has narrowed, the specific areas of disagreement have become clearer. According to press reports, eight were identified in March 1960.[12] The Western side saw this as involving months of negotiation, while the Soviet side saw it as only a matter of weeks.[13] Whichever estimate is correct, the basic requirement that negotiation be carried on in detail is obviously being fulfilled.

Minimizing Internal Costs. There are certain characteristics, other than willingness to bargain in detail, which each of the indispensable signatories must exhibit if agreement is to be reached for an arms-control system. The demands of each state should inflict the least possible cost on the domestic institutions of the other indispensable states.[14] If this cost is deemed unbearable, the negotiations will fail. Arms-control negotiators, for example, have had to take account of the manifest Soviet distaste for unnecessary inspection. Wholly apart from the value placed on secrecy itself as a form of defense, there appear to be broad areas off the established tourists' paths not yet ready to be shown to a curious and not always sympathetic outside world. What are some of the ways in which the invasion of Soviet privacy can be kept to a minimum without stultifying the system?

Technical studies may identify a single, critical, and wholly inspectable link in a chain of operations leading to a violation of an arms-control agreement. Only one such link needs to be inspected in any given chain of operations. The French, for example, have suggested that missile delivery systems are more easily and reliably inspected than are stockpiles of fissionable materials. Great reliance can be placed upon data supplied to the regulating agency by each of the several governments, if there is an unimpeded though not necessarily very frequent spot-checking. The size of the inspectorate would be much less than if the inspectorate gathered all its own data. It has been reported that a government-appointed committee on seismic test improvement, headed by Dr. Lloyd V. Berkner, in July 1959 recommended the use of unmanned seismographic stations to supplement the network of manned stations.[15] Taken together, these suggestions may permit a bridging of the gap between Soviet fears of a "fishing expedition," espionage-like inspection, and American fears of an unreliable control system. It is ironic that the weapons-test ban, the very modest step in arms-control so far the most intensively negotiated, is one that requires more detailed and complex inspection than do many more drastic or comprehensive proposals.[16]

The unacceptable domestic costs may not be wholly constitutional or political. For example, a control plan that hobbled the development of atomic power for peacetime uses could hardly be approved by the United Kingdom.

The Feasible Arms-Control "Package." In a negotiation between independent sovereignties, each government is free at each stage in the progression from arms anarchy to arms control to assume, or to refuse to assume, the obligations of what may be proposed as an additional undertaking. Various proposals favor one side more than the other. For example, the Western demand for a prior notification of space-rocket launchings and for the prohibition of atomic warheads in orbiting rockets may be viewed in the Soviet Union as favoring the side whose rocket technology has lagged. The Soviet demand for stopping *underground* nuclear tests, whether under the name of a cessation with effective controls or under the name of a moratorium without such controls, is viewed in the West as favoring the side whose political system makes it easier to conceal such tests.

The package may or may not include elements unrelated to arms control. "Complete and general disarmament," the shibboleth of Soviet arms-control diplomacy, would be acceptable to the Western side, even in principle, only if its attainment were conditioned upon the simultaneous development of a world police force. On a less comprehensive level, there have been Soviet efforts to combine arms-control proposals that might be attractive to the West with proposals for the abandonment of bases abroad and the delineation in Europe or the Arctic zones of disengagement. The political problem of reaching an arms-control agreement is to discover a "package" of arms limitations which has something in it for each of the indispensable participants.

Stability of the Residual Balance of Power. Arms control must be selective. Selective arms limitations, perhaps even accompanied by qualitative rearmament, must be based on identifying forms of enhancing power that reduce the threat to one side without simultaneously posing a threat for the other, and also on forms of power which increase the threat to the opponent without enhancing the security of one's own side.[17] In the atomic-weapons field this means rendering the balance of terror more stable by agreed and controlled blunting of first-strike capability relatively more than second-strike capability. Thus, the precise location of the missile sites from which retaliatory missiles might be fired would not be deliberately revealed until an extremely comprehensive system of arms control with an international police force was being put into effect.

Indirect as well as direct effects of any given agreement on the residual balance of power have to be calculated. One example will suffice. So long as substantial reliance is placed on the maintenance of the NATO coalition for American and Western security, an arms-control agreement which is so offensive to the French government as to cause it to sabotage or withdraw from NATO may involve a one-sided and unacceptable added risk for which the new agreement is by no means adequate compensation.[18]

Even a perfectly monitored agreement will be unacceptable if the identification of the illicit act does not occur in time to prevent the act from being militarily decisive. Here again, one example will suffice. There can be no total surrender of existing stockpiles until there is a technically well-founded basis for locating undeclared stockpiles, or until a collective security force with its own unquestioned capacity to inflict punishment has been brought into being. "Complete and general" *national* disarmament must await the creation of a world enforcement agency. The attainment of these Siamese-twin goals must remain for the moment a distant hope.

Flexible and Step-by-Step Agreement. The agreement will also be unacceptable, or at any rate not viable, if its indispensable participants feel locked into the system, whatever inadequacies time and technological change may reveal. A method of withdrawal without a catastrophic loss of capacity for self-protection must be left open, unless the system is flexible enough, in dealing with changed circumstance, to continue to command confidence.

One lesson of the Hardtack tests and of the research and public discussion following these American underground tests in the fall of 1958 is clear. An analysis of the requirements of adequate monitoring to which both Soviet and Western scientists had agreed in 1958 was made obsolete even before the political agreement for which it was supposed to pave the way could be completed. There is every reason to believe that the future may bring equally important technical developments calling for changes in the inspection system. If any indispensable participant exercised a veto over these changes in the control system, the others would have to be free to withdraw.

There is a final requirement if arms-control plans are to enjoy the requisite universal confidence: they have to be negotiated and implemented on a step-by-step basis. Each major power in its quest for security through arms control will behave like an elephant crossing a bridge of doubtful strength. The bridge leads from a total reliance on one's own armed strength and that of his allies to an at least partial reliance on a multilateral arms control. Each major power will test the firmness of the bridge by moving one foot forward at a time, and by taking time between steps to become fully confident that it is safe to take the next step.

Each major power (to continue the analogy) will require that the way back be kept fully open, in case the structure of arms-control agreements proves too fragile. This may be by way of withdrawal (or the threat of withdrawal), if the scheme is not regularly adapted to significant technological changes, or if minor violations occur. It may be by way of direct action, and (in the case of the most serious violations) by way of direct retaliatory action. So long as it is confident of its capacity to deal with either a violation or a breakdown of the scheme, a major power can go far in its acceptance of arms control.

Conclusions

Only modest conclusions can be drawn from this description of the forces making for arms control and of the conditions which have to be met if arms control is to be a reality. These conclusions are bound to exasperate both those who believe comprehensive arms control is within reach, if only *our* side would try a little harder, and those who believe arms control is a device of the devil, set to lure gullible democracies into a Soviet trap. The evidence does not suggest that arms-control plans are generally feasible, nor does it suggest that they are inherently infeasible. It all depends on which plan, which participants, and what other issues are currently inflaming world politics.

No arms-control plan is feasible if either side insists on world domination rather than on security. On the other hand, if both envisage a protracted future of coexistence in which no more than limited-war capabilities are used in support of limited objectives, many types of arms control may be feasible, separately or together. Only the more modest types of control may be possible in the first phases; but, if successful, they may create the requisite all-round confidence which would make possible more fundamental controls, such as those over the production of fissionable materials and over missile-delivery systems. Thus, while the need to avoid undermining the balance of terror makes impossible any single great leap into the promised land of "complete and general disarmament," the avenues for constructive statesmanship in arms control are by no means barred.

References

1 This concern for public health may also call for international regulation of the control of atomic wastes. See Walter Schneir, "The Atom's Poisonous Garbage," *The Reporter,* 17 March 1960, pp. 18-22.

2 The phrase is taken from the West's proposals of 14 March 1960 to the Ten-Nation Disarmament Conference in Geneva, convening the next day.

3 See J. David Singer, "Surprise Attack," *The Nation,* 30 January 1959, who notes that Herbert Dinerstein, *War and the Soviet Union* (New York: Praeger, 1959) and Raymond Garthoff, *Soviet Strategy in the Nuclear Age* (New York: Praeger, 1958) agree that there are such Soviet fears.

4 For example, see the discussion of the report of the Coolidge Committee by Thomas J. Hamilton in *The New York Times,* 7 February 1960, and by Dana Adams Schmidt, *ibid.,* 8 February 1960.

5 See Doak Barnett, "The Inclusion of Communist China in an Arms-Control Program," pp. 831-845 of this issue.

6 Arthur Lee Burns, *The Rationale of Catalytic War* (Research Monograph No. 3, Center of International Studies), Princeton: Princeton University, 1959.

7 For an exposition of this point of view, see Karl Popper, *The Open Society and Its Enemies* (Princeton: Princeton University Press, 1960).

8 "Setting and Goals of Arms Control," pp. 681-707 of this issue.

9 President Eisenhower's Special Assistant for Science and Technology has pointed out that "the limitations of technical analysis need [also] to be fully understood. There is no doubt, for instance, that the reliability of monitoring systems is largely a technical question. But the adequacy of such systems, from the point of view of national security, is not. It is a politico-military question." George B. Kistiakowsky, "Science and Foreign Affairs," *Bulletin of the Atomic Scientists,* April 1960, *16:* 116.

10 The American proposals of 14 June 1946, made to the United Nations Atomic Energy Commission by Bernard Baruch, followed the main outlines of the Acheson-Lilienthal report, but added the requirement of an abolition of the veto.

11 How small a quota of follow-up and random inspections is compatible with the politically-determined necessary degree of reliability of detection is a technical matter.

12 *New York Times,* 3 March 1960.

13 *Ibid.,* 30 March 1960.

14 Presumably, each government will have calculated the cost to its own institutions of the proposals it is advancing. Louis Henkin has concluded that the United States could go very far in inspection proposals without vitally endangering its own constitutional system (*Arms Control and Inspection in American Law;* New York: Columbia University Press, 1958).

15 *The New York Times,* 18 February 1960. Hans Bethe, a proponent of the cessation of bomb tests, has estimated that the proposed twenty-one manned stations in the Soviet Union would have to be supplemented by about 600 unmanned ones to give assurance that underground tests were being adequately monitored (*ibid.,* 21 April 1960).

16 See Jerome B. Wiesner, "Comprehensive Arms-Limitation Systems," pp. 915-950 of this issue.

17 William T. R. Fox, "The Politics of Survival and the Bases of World Public Order," *Proceedings of the American Society of International Law,* 1959, p. 139; *cf.* Marion W. Boggs, *Attempts to Define and Limit "Aggressive" Armament in Diplomacy and Strategy.* Columbia: University of Missouri Press, 1941.

18 Those who are skeptical of any arms-control agreement may argue that the most important indirect effect on the residual balance of power is that any agreement will be trumpeted as signalizing the dawn of a new era, and thus it will cause the tax-weary constitutional democracies to let down their guard. However, the processes of meticulous negotiation and public debate before final ratification should educate those elites with a disinterested opinion as to what the agreement can, or cannot, do.

ERICH FROMM

The Case for Unilateral Disarmament

THERE IS LITTLE DOUBT that the proposal for a unilateral disarmament—in the broad sense of the unconditional dismantling of a country's military establishment—will be acceptable neither to the United States nor to the Soviet Union in the immediate future. Hence, inasmuch as this paper is concerned with *practical* suggestions for arms control, it proposes another and very limited concept of unilateral disarmament, one which has been called by Charles Osgood *"graduated unilateral action (or disengagement)"* or which might be called *unilateral initiative in taking practical steps towards disarmament.* The basic idea underlying this concept is that of a radical change of our method of negotiating multilateral disarmament. This change implies that we give up the present method of bargaining in which every concession we make is dependent on a corresponding and guaranteed concession on the part of the Russians; that, instead, we take, unilaterally, gradual steps toward disarmament in the expectation that the Russians will reciprocate and that, thus, the present deadlock in the negotiations for universal disarmament can be broken through.

In order to describe the nature of this policy of unilateral steps, I cannot improve on the following description by Osgood, who, as far as I know, was the first one to express this idea in two brilliant and profound articles.[1] "To be maximally effective," he writes, "in inducing the enemy to reciprocate, a unilateral act (1) should, in terms of *military aggression,* be clearly disadvantageous to the side making it, yet not cripplingly so; (2) should be such as to be clearly perceived by the enemy as reducing his external threat; (3) should not increase the enemy's threat to our heartland;[2] (4) should be such that reciprocal action by the enemy is clearly available and clearly indicated; (5) should be announced in advance and widely publicized to ally, neutral and enemy countries—as regards the nature of the act, its purpose as part of a consistent policy, and the expected reciprocation; but (6) should not demand prior commitment to reciprocation by the enemy as a condition for its commission."[3]

As to the specific steps which should be taken in this fashion, it would require a great deal of further thought, aided by competent specialists. But in order to give at least an idea of the concrete steps this policy would envisage, I want to mention the following (some of them in agreement with Osgood): sharing of scientific information; stopping of atomic tests; troop reductions; evacuation of one or more military bases; discontinuation of German rearmament; etc. The expectation is that the Russians are as willing as we are to avoid war, hence that they will begin to reciprocate and that once the course of mutual suspicion has been reversed, bigger steps can be taken which may lead to complete bilateral disarmament. Furthermore, I believe that disarmament negotiations should be paralleled by *political* negotiations, which aim essentially at mutual noninterference on the basis of the recognition of the *status quo*. Here, too (and again in essential agreement with Osgood's position), unilateral steps such as the recognition of the Oder-Neisse line and admission of China to the United Nations would be taken in the expectation of reciprocation by the Russians (i.e., curbing of Chinese aggression, noninterference in the Middle and Far East).

What are the premises underlying the proposition for unilateral steps towards disarmament? (At this point I shall mention only some fundamental ones, while others will be discussed in the second part of this paper which presents the argument for total unilateral disarmament.) They are briefly: (1) that, as indicated before, the present method of negotiations does not seem to lead to the goal of bilateral disarmament because of the deeply ingrained mutual suspicions and fears; (2) that without achieving *complete* disarmament, the armament race will continue and lead to the destruction of our civilization as well as that of the Russians or, even without the outbreak of a war, will slowly undermine and eventually destroy the values in defense of which we are risking our physical existence; (3) that while unilateral steps constitute a definite risk (and must do so by the very nature of the idea), the risk at every step is not a crippling one and is infinitely smaller than the danger we run by the continuation of the arms race.

Even though the broader concept of complete—rather than graduated—unilateral disarmament is, as stated before, not a practical possibility in the near future, as far as the United States and the

USSR are concerned, I believe it worthwhile to present the arguments for this position, not primarily because the editor of this journal asked me to present this position nor even because I share it with a small minority of others who believe that the risks in the continuation of the armament race are far greater than the very serious risks of unilateral disarmament. While both reasons might not be sufficient to justify the following presentation, I do believe that it is not only justified but important for another reason: thinking through the arguments for a radical—even though practically unacceptable position—contributes to breaking through the thought barrier which prevents us now from getting out of the dangerous circle of seeking peace by means of threat and counterthreat. Taking seriously the reasoning which supports the unpopular position of complete unilateral disarmament can open up new approaches and viewpoints which are important even if our practical aim is that of graduated unilateral action or even only that of negotiated bilateral disarmament. I believe that the difficulty of arriving at complete disarmament lies to a large extent in the frozen stereotypes of feelings and thought habits on both sides and that any attempt at unfreezing these patterns and of rethinking the whole problem can be of importance in finding a way out of the present dangerous impasse.

The proposal for complete unilateral disarmament has been advocated from a religious, moral or pacifist position by such men as Victor Gollancz, Lewis Mumford, and some Quakers. It has also been supported by men like Bertrand Russell, Stephen King-Hall, and C. W. Mills, who are not opposed to the use of force under all or any circumstances, yet who are uncompromisingly opposed both to thermonuclear war and to all and any preparation for it. This writer finds himself somewhat between the position of the strict pacifists and men like Bertrand Russell and Stephen King-Hall.[4]

The difference between these two groups, however, is not as fundamental as it may seem. They are united by their critical attitude toward the irrational aspects of international politics and by their deep reverence for life. They share the conviction of the oneness of the human race and faith in the spiritual and intellectual potentialities of man. They follow the dictates of their conscience in refusing to have any "part in making millions of women and children and noncombatants hostages for the behavior of their own governments."[5] Whether they think in theistic terms or in those of nontheistic humanism (in the sense of the philosophic continuum from Stoic to eighteenth-century Enlightenment philosophy), they all are rooted in the same spiritual tradition and are unwilling to compromise with its principles. They are united by their uncompromising opposition to any kind of idolatry, including the idolatry of the state. While their opposition to the Soviet system is rooted precisely in this attitude against idolatry, they are critical of idolatry whenever it appears in the Western world whether it is in the name of God or of democracy.

While there is no proponent of unilateral disarmament who does not believe that the individual must be willing to give his life for the sake of his supreme values, if such an ultimate necessity arises, they are all equally convinced that to risk the life of the human race, or even the results of its best efforts in the last five thousand years, is immoral and irresponsible. As warfare becomes at once more senseless and more devastating, the convergence between religious pacifist, humanist, and pragmatic opponents to nuclear armament grows.

From the standpoint of the proponents of unilateral disarmament, to continue the armament race is catastrophic, *whether the deterrent works or not.* In the first place, they have little faith that the deterrent will prevent the outbreak of a thermonuclear war.[6] They believe that the results of a thermonuclear war would be such that in the very "best" case they completely belie the idea that we ought to fight such a war in order to save our democratic way of life. There is no need to enter the guessing game as to whether one-third or two-thirds of the population of the two opponents and what proportion of the neutral world (depending on how the wind blows) will be destroyed. This is a guessing game that verges on madness; for to consider the possibility of the destruction of 30%, 60%, or 90% of one's own and the enemy's population as an acceptable (although, of course, most undesirable) result of one's policy is indeed approaching pathology. The increasing split between intellect and affect, which is so characteristic of our Western development in the last centuries, has reached its dangerous, schizoid peak in the calm and allegedly rational way in which we can discuss possible world destruction as a result of our own action. It does not take much imagination to visualize that sudden destruction and the threat of slow death to a large part of the American population, or the Russian population, or large parts of the world, will create such a panic, fury, and despair as could only be compared with the mass psychosis resulting from the Black Death in the Middle Ages. The traumatic effects of such a catastrophe would lead to a new form of primitive barbarism, to the resurgence of the most archaic elements, which are still potentialities in every man and of which we have had ample evidence in the terror systems of Hitler and Stalin. It would sound most unlikely to many students of human nature and psychopathology that human beings could cherish freedom, respect for life or love after having witnessed and participated in the unlimited cruelty of man against man which thermonuclear war would mean. It is a psychological fact that acts of brutality have a brutalizing effect on the participants and lead to more brutality.

But What if the Deterrent Works?

What is the likely future of the social character of man in a bilateral or multilateral armed world, where, no matter how complex the problems or how full the satisfactions of any particular society, the biggest and most pervasive reality in any man's life is the poised missile, the humming data processor connected to it, the waiting radiation counters and seismographs, the over-all technocratic perfection (overlying the nagging but impotent fear of its imperfection) of the mechanism of holocaust? To live for any length of time under the constant threat of destruction creates certain psychological effects in most human beings—fright, hostility, callousness, a hardening of the heart, and a resulting indifference to all the values we cherish. Such conditions will transform us into barbarians—though barbarians equipped with the most complicated machines. If we are serious in claiming that our aim is to preserve freedom (that is, to prevent the subordination of the individual under an all-powerful state), we must admit that this freedom will be lost, whether the deterrent works or does not work.

Aside from these psychological facts, the continuation of the arms race constitutes a particular threat to Western culture. In the process of conquering nature, producing and consuming have become Western man's main preoccupation—the goal of his life. We have transformed means into ends. We manufacture machines which are like men, and we produce men who are like machines. In his work, the individual is managed as a part of a production team. During his leisure time, he is manipulated as a consumer who likes what he is told to like and yet has the illusion that he follows his own taste. In centering his life around the production of things, man himself is in danger of becoming a thing, worshiping the idols of the production machine and the state while he is under the illusion of worshiping God. "Things are in the saddle and ride mankind," as Emerson has put it. Circumstances which we created have consolidated themselves into powers which rule over us. The technical and bureaucratic system we have built tells us what to do, it decides for us.

We may not be in danger of becoming slaves, but we are in danger of becoming robots, and the human values of our tradition are threatened—integrity, individuality, responsibility, reason, and love. Talking about these values more and more becomes an empty ritual.

This trend toward a world of impotent men directed by virile machines (both in the United States and in the Soviet Union)—brought about by technological and demographic factors, and by the increasing centralization and bureaucracy in big corporations and government—will reach the point of no return if we continue the arms race. Dangerous as our present situation is, we still have a chance to put man back into the saddle, to effect a renaissance of the spiritual values of the great humanistic tradition. Unless such a renaissance occurs, unless we can achieve a radical revitalization of the spirit on which our culture is founded, we shall lose the vitality necessary for survival and we shall decay, just as many other great powers have decayed in history. The real threat to our existence is not Communist ideology, it is not even the Communist military power—it is the hollowness of our beliefs, the fact that freedom, individuality, and faith have become empty formulas, that God has become an idol, that our vitality is sapped because we have no vision except that of having more of the same. It seems that a great deal of the hatred of Communism is, in the last analysis, based on a deep disbelief in the spiritual values of democracy. Hence, instead of experiencing love of what we are *for*, we experience hate of what we are *against*. If we continue to live in fear of extinction and to plan mass destruction of others, the last chance for a revival of our humanist-spiritual tradition will be lost.

Benefits and Dangers of Unilateral Disarmament

If these are the dangers of the policy of the deterrent, what do the proponents of unilateral disarmament consider to be the benefits—and the dangers—of their policy?

The most likely result of unilateral disarmament—whether it be undertaken by the United States or by the Soviet Union—is that it would prevent war. The main reason which could impel either the Soviet Union or the United States to atomic war is the constant fear of being attacked and pulverized by the opponent. This position is succinctly expressed by Herman Kahn, who is in no way a proponent of unilateral disarmament. Kahn states that, "aside from the ideological differences and the problem of security itself, there does not seem to be any objective quarrel between the United States and

Russia that justifies the risks and costs that we subject each other to. The big thing that the Soviet Union and the United States have to fear from each other is fear itself."[8] If, indeed, the main cause of war lies in mutual fear, then the disarmament of either the Soviet Union or the United States would most likely do away with this major cause and, thus, with the probability of war.

But are there motives other than fear which could prompt the Soviet Union to try for world conquest? One such motive could be economic interest in expansion, which was a basic motivation for the initiation of war in the nineteenth century and also for the first two World Wars. Exactly here we see the difference between the nature of the conflicts in 1914 or 1939 and the present situation. In World War I, Germany threatened British markets and the French sources of coal and iron; in 1939, Hitler needed territorial conquest for the economic expansion he wanted. Today, neither the Soviet Union nor the United States has overriding economic interests in the conquest of markets and supplies, since a 2 or 3 percent rise in the level of national productivity would bring a greater advantage than would any military conquest, and, moreover, each has the capital, raw material, supplies, and population for a constant increase in its general productivity.[9]

The more serious possible motive is found in the fear, widely held in the United States, that the Soviet Union is out to conquer the world for Communism and that, if the United States disarmed, Russia would be all the more eager to achieve her wish for world domination. This idea of Russian intentions is based on an erroneous appreciation of the nature of the present-day Soviet Union. It is true that under Lenin and Trotzky the Russian Revolution was aimed at conquering the capitalistic world (or at least, Europe) for Communism, partly because the Communist leaders were convinced that there was no possibility of success for Communist Russia unless the highly industrialized states of Europe (or at least Germany) joined their system, and partly because they were prompted by the belief that the victory of the Communist revolution in the world would bring about the fulfillment of their secular-messianic hopes.

The failure of these hopes and the ensuing victory of Stalin brought about a complete change in the nature of Soviet Communism. The annihilation of almost all the old Bolsheviks was only a symbolic act for the destruction of the old revolutionary idea. Stalin's slogan of "socialism in one country" covered one simple aim—the rapid industrialization of Russia, which the Czarist system had not accomplished. Russia repeated the same process of accumulating capital which Western capitalism had gone through in the eighteenth and nineteenth centuries. The essential difference is that, while in these centuries in the West the sanctions were purely economic, the Stalinist system now developed political sanctions of direct terror; in addition, it employed socialist ideology to sugar-coat the exploitation of the masses. The Stalinist system was neither a socialist nor a revolutionary system, but a state-capitalism based on ruthless methods of planning and economic centralization.

The period of Khrushchevism is characterized by the fact that capital accumulation has succeeded to a point where the population can enjoy a great deal more consumption and is less forced to make sacrifices; as a result, the political terror can be greatly reduced.

But Khrushchevism has by no means changed the basic character of Soviet society in one essential respect: it is not a revolutionary nor a socialist regime, but one of the most conservative, class-ridden regimes anywhere in the Western world, humanly coercive, economically effective. While the aim of democratic socialism was the emancipation of man, the overcoming of his alienation, and the eventual abolition of the state, the "socialist" slogans used in Soviet Russia reflect empty ideologies, and the social reality is the very opposite of true socialism. The ruling class of the Soviet Union is no more revolutionary than the Renaissance popes were followers of the teachings of Christ. To try to explain Khrushchev by quoting Marx, Lenin, or Trotzky shows an utter failure to understand the historical development which has taken place in the Soviet Union and an incapacity to appreciate the difference between facts and ideologies. It should be added that our attitude is the best propaganda service the Russians could wish for. Against the facts, they try to convince the workers of Western Europe and the peasants in Asia that they represent the ideas of socialism, of a classless society, etc. The Western attitude, of falling for this propaganda, does exactly what the Russians want: to confirm these claims. (Unfortunately very few people except democratic socialists have sufficient knowledge of the difference between socialism and its distorted and corrupt form which calls itself Soviet socialism.)

The role of Russia is still more emphasized by the fact that Russia feels threatened by a potentially expansionist China. Russia one day might be in the same position with regard to China as we believe we are in relation to Russia. If the threat to Russia from the United States were to disappear, Russia could devote her energy to coping with the threat from China, unless by universal disarmament this threat would cease to exist.

The above-mentioned considerations indicate that the dangers which might arise if the Soviet Union were not to give up its armaments are more remote than they seem to many. Would the Soviet Union use her military superiority to try to occupy the United States or Western Europe? Aside from the fact that it would be exceedingly difficult, to say the least, for the Soviet Union's agents to run the economic and political machines of the United States or Western Europe, and aside from the fact that there is no vital need for Russia to conquer these territories, it would be most inconvenient to try to do so—and for a reason which is generally not sufficiently appreciated. Even the pro-Communist workers in the West have no idea of the degree of coercion to which they would have to submit under a Soviet system. They, as well as non-Communist workers, would oppose the new authorities, who would be forced to use tanks and machine guns against the protesting workers. This would encourage revolutionary tendencies in the satellite states, or even within the Soviet Union, and be most undesirable to the Soviet rulers; it would especially endanger Khrushchev's policy of liberalization, and hence his whole political position.

Eventually the Soviet Union might try to exploit its military superiority for the penetration of Asia and Africa. This is possible, but, with our present policy of the deterrent, it is doubtful whether the United States would really be willing to start a thermonuclear war in order to prevent the Russians from gaining certain advantages in the world outside of Europe and the Americas.

All these assumptions may be wrong. The position of the proponents of unilateral disarmament is that the chance that they are wrong is much smaller than the chance that the continuation of the arms race will finish civilization as we cherish it.

Some Psychological Considerations

One cannot discuss the question of what might happen as a result of unilateral disarmament—or, for that matter, of any mutual disarmament—without examining some psychological arguments. The most popular one is that "the Russians cannot be trusted." If "trust" is meant in a moral sense, it is unfortunately true that political leaders can rarely be trusted. The reason lies in the split between private and public morals: the state, having become an idol, justifies any immorality if committed in its interest, while the very same political leaders would not commit the same acts if they were acting in behalf of their own private interests. However, there is another meaning to "trust in people," a meaning which is much more relevant to the problem of politics: the trust that they are sane and rational beings, and that they will act accordingly. If I deal with an opponent in whose sanity I trust, I can appreciate his motivations and to some extent predict them, because there are certain rules and aims, like that of survival or that of commensurateness between aims and means, which are common to all sane people. Hitler could not be trusted because he was lacking in sanity, and this very lack destroyed both him and his regime. It seems quite clear that the Russian leaders of today are sane and rational people; therefore, it is important not only to know what they are capable of, but also to predict what they might be motivated to do.[10]

This question of the leaders' and the people's sanity leads to another consideration which affects us as much as it does the Russians. In the current discussion on armament control, many arguments are based on the question of what is *possible,* rather than on what is *probable.* The difference between these two modes of thinking is precisely the difference between *paranoid* and *sane* thinking. The paranoiac's unshakable conviction in the validity of his delusion rests upon the fact that it is logically possible, and, so, unassailable. It is logically possible that his wife, children, and colleagues hate him and are conspiring to kill him. The patient cannot be convinced that his delusion is *impossible;* he can only be told that it is exceedingly *unlikely.* While the latter position requires an examination and evaluation of the facts and also a certain amount of faith in life, the paranoid position can satisfy itself with the possibility alone. I submit that our political thinking suffers from such paranoid trends. We should be concerned, not with the possibilities, but rather with the probabilities. This is the only sane and realistic way of conducting the affairs of national as well as of individual life.

Again on the psychological plane, there are certain misunderstandings of the radical disarmament position which occur in many of the discussions. First of all, the position of unilateral disarmament has been understood as one of submission and resignation. On the contrary, the pacifists as well as the humanist pragmatists believe that unilateral disarmament is possible only as an expression of a deep spiritual and moral change within ourselves: it is an act of courage and resistance—not one of cowardice or surrender. Forms of resistance differ in accordance with the respective viewpoints. On the other hand, Gandhists and men like King-Hall advocate nonviolent resistance, which undoubtedly requires the maximum of courage and faith; they refer to the example of Indian resistance against

Britain or Norwegian resistance against the Nazis. This point of view is succinctly expressed in *Speak Truth to Power* (see reference 4):

> Thus, we dissociate ourselves from the basically selfish attitude that has been miscalled pacifism, but that might be more accurately described as a kind of irresponsible antimilitarism. We dissociate ourselves also from utopianism. Though the choice of nonviolence involves a radical change in men, it does not require perfection. . . . We have tried to make it clear that readiness to accept suffering—rather than inflict it on others—is the essence of the nonviolent life, and that we must be prepared if called upon to pay the ultimate price. Obviously, if men are willing to spend billions of treasure and countless lives in war, they cannot dismiss the case for nonviolence by saying that in a nonviolent struggle people might be killed! It is equally clear that where commitment and the readiness to sacrifice are lacking, nonviolent resistance cannot be effective. On the contrary, it demands greater discipline, more arduous training, and more courage than its violent counterpart.[11]

Some think of armed resistance, of men and women defending their lives and their freedom with rifles, pistols, or knives. It is not unrealistic to think that both forms of resistance, nonviolent or violent, might deter an aggressor from attacking. At least, it is more realistic than to think that the use of thermonuclear weapons could lead to a "victory for democracy."

The proponents of "security by armament" sometimes accuse us of having an unrealistic, flatly optimistic picture of the nature of man. They remind us that this "perverse human being has a dark, illogical, irrational side."[12] They even go so far as to say that "the paradox of nuclear deterrence is a variant of the fundamental Christian paradox. In order to *live,* we must express our willingness to kill and to die."[13] Apart from this crude falsification of Christian teaching, we are by no means oblivious of the potential evil within man and of the tragic aspect of life. Indeed, there are situations in which man must be willing to die in order to live. In the sacrifices necessary for violent or nonviolent resistance, I can see an expression of the acceptance of tragedy and sacrifice. But, there is no tragedy or sacrifice in irresponsibility and carelessness: there is no meaning or dignity in the idea of the destruction of mankind and of civilization. Man has in himself a potential for evil; his whole existence is beset by dichotomies rooted in the very conditions of his existence. But these truly tragic aspects must not be confused with the results of stupidity and lack of imagination, with the willingness to stake the future of mankind on a gamble.

Finally, to take up one last criticism, directed against the position of unilateral disarmament: that it is "soft" on Communism. Our position is precisely based on the negation of the Soviet principle of the omnipotence of the state. Just because the spokesmen for unilateral disarmament are drastically opposed to the supremacy of the state, they do not want to grant the state the ever-increasing power which is unavoidable in the arms race, and they deny the right of the state to make decisions which can lead to the destruction of a great part of humanity and can doom future generations. If the basic conflict between the Soviet system and the democratic world is the question of the defense of the individual against the encroachment of an omnipotent state, then, indeed, the position for unilateral disarmament is the one which is most radically opposed to the Soviet principle.

After having discussed the case for unilateral disarmament (in the broad sense), I want to return to the practical proposition of unilateral steps toward disarmament. I do not deny that there are risks involved in this limited form of unilateral action but considering the fact that the present method of negotiations has produced no results and that the chances that they will in the future are rather slim, considering furthermore the grave risk involved in the continuation of the arms race, I believe that it is practically and morally justified to take this risk. At present we are caught in a position with little chance for survival, unless we want to take refuge in hopes. *If* we have enough shelters, *if* there is enough time for a warning and strategic evacuation of cities, *if* the "United States' active offenses and active defenses can gain control of the military situation after only a few exchanges,"[14] we might have only five, or twenty-five, or seventy million killed. However, if these conditions do not materialize, "an enemy could, by repeated strikes, reach almost any level of death and destruction he wished."[15] (And, I assume, the same threat exists for the Soviet Union.) In such a situation, "when nations are poised at the last moment when an agreement appears possible to end the risk of horrifying war, unleashed by fanatics, lunatics or men of ambition,"[16] it is imperative to shake off the inertia of our accustomed thinking, to seek for new approaches to the problem, and above all, to see new alternatives to the present choices that confront us.

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1 Charles E. Osgood's "Suggestions for Winning the Real War with Communism," "Conflict Resolution," vol. III, no. 4, December 1959, p. 131, and also "A Case for Graduated Unilateral Disarmament," *Bulletin of Atomic Scientists*, vol. XVI, no. 4, pp. 127 ff.

2 This condition is in my opinion to be taken only as an optimal *desideratum*, since any weakening of one power's aggressive potential means strategically some increase in the opponent's aggressive potential.

3 Charles E. Osgood's "Suggestions for Winning the Real War with Communism," p. 316.

4 Bertrand Russell, *Common Sense and Nuclear Warfare*. London: G. Allen & Unwin, Ltd., 1959. Stephen King-Hall, *Defense in the Nuclear Age*. Nyack, N.Y.: Fellowship Publications, 1959. Jerome Davis and General H. B. Hester, *On the Brink*. New York: Lyle Stuart, 1959. Lewis Mumford, *The Human Way Out*. Pendell Hill Pamphlet no. 97, 1958. C. W. Mills, *The Causes of World War Three*. New York, 1959. George F. Kennan, "Foreign Policy and Christian Conscience," *The Atlantic Monthly*, May 1959. Richard B. Gregg, *The Power of Nonviolence*. Nyack, N.Y.: Fellowship Publications, 1959, American Friends Service Committee, *Speak Truth to Power, Quaker Search for an Alternative to Balance*. 1955.

5 George F. Kennan, *loc. cit.* pp. 44 ff.

6 This premise is shared by the report of the National Planning Association of America: *1970 Without Arms Control; Implications of Modern Weapons Technology* (by NPA Special Project Committee on Security through Arms Control; Planning Pamphlet no. 104, May 1958, Washington, D.C.), which states: "Not only does the danger of war remain a possibility, but the probability totalled over time increases, becoming a certainty if sufficient time elapses without succeeding in finding alternatives." Or, E. Finley Carter, President of the Stanford Research Institute, writes: "In the search for security through the application of technology to weapons for destruction, the Soviet bloc and the Western allies have created a mortal common enemy—the threat of accidental nuclear war" (*SRI Journal*, Stanford Research Institute, Fourth Quarter, 1959, vol. 3, p. 198). Herman Kahn also concludes, "It is most unlikely that the world can live with an uncontrolled arms race lasting for several decades" (*ibid.*, p. 139). He emphasizes that it is unrealistic to believe that war has become impossible because of its extremely destructive character.

The advisor on Science and Technology of the Democratic Advisory Council of 27 December 1959 declared: "All-out nuclear war seems not only possible but probable as long as we pursue our present military policies and fail to achieve international agreements of broad scope designed to alleviate this unstable situation. The triggering of a nuclear war by mistake, by misadventure or by miscalculation is a constant danger." It must be stressed that the danger lies not only in technical errors, but equally in the blundering decision-making by political and military leaders. If one remembers the political and military blunders committed by many of the leaders in the conduct of wars of 1914 and 1939, it is not difficult to visualize that, given present-day weapons, the same type of leaders will blow the world to pieces,

in spite of good intentions.

7 For a detailed analysis of modern society cf. my *The Sane Society.* New York: Rinehart and Co., 1955.

8 *SRI Journal,* 1959, vol. 3, p. 140.

9 For the very same reasons, there is a real chance for the future abolition of war, a chance which never existed in the past. In most of man's history, the improvement of his material situation required an increase in human energy (slaves), additional land for cattle raising or agriculture, or new sources of raw materials. The techniques of the present and of the future will permit an increase in material wealth by an increased industrial and—indirectly—an agricultural productivity, without the need of enslaving or robbing others. At present and in the future, war would have as its only "rationale" the irrationality of human desire for power and conquest.

10 Whether or not political leaders are sane is not a matter of historical accident. Any government which has set out to do the impossible—for instance, to achieve equality and justice when the requisite material conditions are lacking—will produce fanatical and irrational leaders. This was the case with Robespierre, as it was with Stalin. Or, a government which tries to reconcile the interests of the most backward social class (the lower middle class) with those of the economically progressive classes (workers and businessmen) as the Nazi government did, again will produce fanatical and irrational leaders. The Soviet Union today is on the road toward solving its economic problems successfully; hence it is not surprising that her leaders are realistic men of common sense.

11 *Loc. cit.* p. 52 and p. 65.

12 Peter B. Young, "The Renunciationists," *Airpower,* the Air Force Historical Foundation, vol. VII, no. 1, p. 33.

13 *Ibid.*

14 Herman Kahn, *Report on a Study of Non-Military Defense.* Rand Corporation, 1958, p. 13.

15 *Ibid.*

16 General de Gaulle, in a speech in April 1960.

HARRISON BROWN

Tasks for a World without War

Introduction

IF WAR IS ELIMINATED as a way of resolving conflicts, whether through the establishment of a world government—limited or otherwise—or by some other means, the world of the future will still be confronted by a multiplicity of problems. Even without the threat of war, some of the next most serious problems which confront mankind would by no means be solved completely, although many would be eased. A number of these problems by their nature have traditionally depended upon the existence of warfare for their solution. Although the revision of boundaries, the redistribution of ethnic groups and the allocation of natural resources have often been settled peacefully, in most cases the very existence of military power has played a predominant role in determining specific solutions.

Clearly, if war is to be eliminated, it is important that we find substitutes for warfare in the solution of the problems which arise between nations and groups of nations. It is important therefore that we attempt to form some conception of what those problems are likely to be. Sketched in broad strokes, what might the technological-demographic-economic environment of the world be like in the decades ahead?

Industrial Civilization

Most of the difficulties confronting us today stem from the fact that we are living in the middle of an enormous revolution, which is characterized primarily by rapid technological change. Never before in history has society changed as rapidly as it is changing today. The closest parallel to our modern situation occurred about 7,000 years ago, when our primitive food-gathering ancestors learned that they could cultivate edible plants and domesticate animals. With the emergence of these new techniques, more than 500 persons could be supported in areas where previously only one could be supported.

Before the invention of agriculture, human populations had spread throughout the temperate and tropical regions. The world, though sparsely populated by our standards, was saturated with human beings within the framework of the technology then in existence. With the techniques available, the whole earth could not have supported more than about ten million persons. Following the onset of the agricultural revolution, human populations increased rapidly.

Long before the agricultural revolution came to an end, another phase of human existence began with the industrial revolution.

From its early beginnings, industrial civilization emerged in Western Europe, then spread to North America and later to Russia and Japan. Today it is transforming China and India. Barring a catastrophe, it seems inevitable that machine culture, like agriculture, is destined one day to become world-wide.

One of the results of the industrial revolution was an acceleration in the spread of agriculture throughout the world. A second result was a dramatic upsurge in the rate of population growth, brought about by rapidly decreasing mortality rates. Scientific methods of agriculture made possible higher crop yields. Efficient and rapid transportation systems virtually eliminated large-scale famine. Sanitation techniques, immunization, and other medical innovations reduced premature deaths among the young. The numbers of human beings jumped from about 500 million in 1650 to 2,800 million in 1960.

Today we are closer to the beginning of the industrial revolution than we are to its end. At one end of the economic scale are the people of the United States, representing only 6 percent of the world's population but consuming about 50 percent of the goods produced in the world. At the opposite end of the scale we find the vast populations which dwell in the greater part of Asia, in parts of Africa, in all of Central America, and in parts of South America. Fully 50 percent of the world's population live under conditions of extreme poverty, with food supplies far less than the minimum required for a healthy existence, and with misery and privation the rule rather than the exception.

America's Next Fifty Years

Many of the problems which confront the world at present involve the difficult nature of the transition from a culture which is primarily agrarian to one which is primarily urban-industrial. The United States has traveled down the road of industrialization further than any nation. A projection of the basic changes taking place within our own society can provide important indications concerning the future of a highly industrialized world.

During the next fifty years it is likely that the population of the continental United States will more than double, giving us about 400 million persons. Because there is little reason to believe that our population density will stop much short of the current level in Western Europe, one may expect eventually a population of about 1,000 million persons. The new additions will be primarily city and town oriented. Cities will spread over vast areas. Fifty years from now an additional area the size of the state of West Virginia will be urbanized. On the Pacific Coast alone, new city expansion may take place, totaling fifteen times the present area of the city of Los Angeles.

As the process of urbanization continues and as our society becomes increasingly complex, the requirements for transportation and communication facilities will probably increase rapidly. It seems likely that during the next fifty years the total ton-mileage of freight which must be shipped to support the population will more than triple. Inter-city passenger traffic may increase ten-fold, while the numbers of telephone conversations and pieces of mail may increase seven-fold.

The processes of mechanization and automation are resulting in rapidly increasing rates of both agricultural and industrial production per man-hour worked. We might expect during the next fifty years a three- to ten-fold increase in agricultural productivity, and perhaps a two- to four-fold increase in industrial productivity.

As in the past, these greater levels of productivity will be achieved in part by our consuming vastly greater quantities of raw materials and by our feeding greatly increased quantities of energy into the industrial network. During the next fifty years it is not unreasonable to suppose that the production of basic materials such as steel will increase about five-fold and that electrical power production will increase another ten-fold. Our total energy demands will probably increase four-fold, corresponding to a doubling of energy consumption per person. Even on a per capita basis, our raw-material demands are destined to increase considerably in the decades ahead. When we couple this with the expected population growth, it is clear that our raw-material demands fifty years from now will dwarf those of today.

Enormous quantities of materials are required to support an individual in the United States. We produce each year, for each person, about 1,300 pounds of steel, 23 pounds of copper and 16 pounds of lead, in addition to considerable quantities of other metals. Our demands for nonmetals are even more impressive. These quantities will almost certainly increase considerably in the decades ahead.

In addition to the materials consumed, the quantities of materials which must be in existence in order to support an individual have increased steadily. For every person in the United States there are probably in existence, together with other metals, about 9 tons of steel, over 300 pounds of copper, about 100 pounds of lead, and about 200 pounds of zinc. It seems clear that these quantities of materials in use will continue to rise. One can expect that by the turn of the century the figure for steel will increase to about 15 tons. In the first place, the quantities of things which people are willing to buy has not as yet reached the saturation level. Second, we must work ever harder in order to obtain the raw materials we need. Having used up the easily accessible ore deposits, we require a great deal more technology, more equipment, more steel, and greater energy expenditure to produce a pound of metal today than was required in 1900.

It seems plausible that by the turn of the century steel production in the United States will exceed 400 million tons annually. Increasing demands for metals will bring about increasing demands for metallic ores. As demands increase and as the grades of domestic ores decrease, it will become more difficult for us to find supplies of raw materials to keep our industrial network functioning. Increasing quantities of these materials such as iron ore, bauxite, copper ore, and petroleum must come from abroad. By 1980, the United States may well be one of the poorest nations in the world with respect to high-grade raw materials. For the United States, therefore, the next fifty years will be characterized by a growing dependence of the United States upon the natural resources of other major areas of the world. Of course, as industrialization spreads to other areas, competition for the earth's resources will increase dramatically.

Eventually high-grade resources are destined to disappear from the earth. Decreasing grades of ores will be compensated for by increasing energy consumption. When that time arrives, industrial civilization will feed upon the leanest of raw materials—sea water, air, ordinary rock, sedimentary deposits such as limestones and phosphate rock, and sunlight.

As grades of ore diminish, industries will become more complex and highly integrated. It seems likely that we will eventually reach the point where we shall have vast assemblages of plants, particularly in coastal regions, where rock is quarried, uranium and other metals are isolated, nitric acid is manufactured, atomic power is generated, hydrogen is produced, iron ores are reduced to pig iron, aluminum and magnesium metals are prepared, and vast quantities of liquid fuels and organic chemicals are manufactured. The single-purpose plant is likely to diminish in importance, and eventually to disappear. When this time is reached, most of the major industrial areas of the world will find it easier to gain their sustenance by applying science and technology to the task of processing domestic, low-grade substances than to look abroad. But before that time is reached, we will pass through a period of increasing dependence upon imports. As population increases, as new cities emerge and old ones merge, there will be increased crowding and a multiplication of the problems which have long been characteristic of highly urbanized areas. The basic domestic problems in the United States will be those of a densely populated industrial nation in which the metropolitan area is the basic unit. Regional differences in population patterns will disappear.

Properly planned and financed, the new urban areas could be pleasant places in which to live. Unplanned, and in the absence of adequate public funds for public facilities and services, a vast nationwide slum could emerge in a relatively short time. Indeed our political-social-economic situation a few decades from now will depend in large part upon our attitudes toward the expenditure of public funds, toward long-range planning, and toward the powers of the various levels of local, state, and federal government.

The increasing technological and sociological complexity of our society will result in the need for higher levels of education. At the turn of the century, more than one out of every three workers were unskilled. By 1950 only one in five workers remained unskilled. By contrast, our need for professional workers has increased five-fold in the last half century. Even more important, our need for professional workers is still increasing rapidly and seems destined to increase at least another five-fold in the next fifty years. Scientists and engineers alone have increased ten-fold in number in the last half century.

The process of automation will result in a considerable dislocation of labor in certain industries and in certain localities. The higher productivity which will result, reaching perhaps four times that of the present level within 50 years, will give rise to several major problems. Will this result in higher total production or in more leisure?

If the end result is higher production, to whom will the goods be sold? Can they be absorbed domestically or will they be sold abroad? If the end result is more leisure, how will the hours of work and the wages be divided? And how will people spend their leisure time? The answers to these questions will depend in part upon the decisions which are made in the next decade concerning many aspects of foreign policy as well as domestic policy.

The Upsurge of Population

The population of the world is increasing rapidly. Even more important, however, is the fact that the *rate* of population growth is increasing rapidly as well. Between 1850 and 1900 the world population grew at a rate of about 0.7 percent per year. During the following half century, the average annual rate of increase was 0.9 percent per year. Between 1950 and 1956 the annual rate of increase averaged 1.6 percent. This remarkable increase in the rate of population growth has resulted primarily from rapidly lowered death rates.

We do not have to look far to find the reasons for the rapid decline in mortality in the underdeveloped areas. It is now possible to treat many of the diseases which are widespread in these areas on a mass basis, and control can be achieved at low cost. Insecticides such as DDT, vaccines such as BCG, and antibiotics such as penicillin are some of the developments which have made control possible on a mass basis. For example, widespread spraying of the island of Ceylon with DDT resulted in a decrease of mortality by 34 percent in one year alone. As a result of the spread of such techniques, the population of Costa Rica is growing at a rate of 3.7 percent per year. The rates in many other areas are nearly as large: Mexico, 2.9 percent; Ceylon, 2.8 percent; Puerto Rico, 2.8 percent—all compared with a world average of about 1.6 percent.

As industrialization spreads to other areas of the world and as techniques of birth control are adopted by various cultures, it is possible that birth rates will fall. If we assume, for example, that the rate of population growth in the West will fall to very low levels by 1975 (which may be true in Western Europe but which almost certainly will not be true in North America), that rates of growth in Japan, Eastern Europe, and Oceania will fall to low levels by the turn of the next century, that Africa, South Central Asia, most of Latin America and China will pass through the industrial transition in 75 years, and that a full century will be required for most of the Near East, then we arrive at a world population of close to 7 billion before stabilization is approached. No matter how optimistic we are, however, it is difficult to visualize a set of circumstances not involving widespread catastrophe, which can result in the leveling off of world population at much less than this figure. The earth may eventually be called upon to provide for a substantially higher population than this.

The demographic changes which are taking place in the world, particularly in those regions which are still predominantly agrarian, are resulting primarily from the application of techniques which are relatively inexpensive, require little capital, and which can be spread without educating large numbers of persons. The task of controlling epidemic and endemic diseases is a relatively easy one, compared with the task of increasing food production, improving housing, or enlarging the over-all per capita availability of consumer goods. The latter necessitates a level of industrialization far above that which currently exists in these areas.

Rates of Development

In three-quarters of the world, persons are now living at extremely low levels of consumption. We can easily appreciate the magnitude of the task that is involved in the industrial development of these areas when we examine the huge quantities of materials which would be required. If all persons in the world were suddenly brought up to the level of living now enjoyed by the people of the United States, we would have to extract from the earth about 18 billion tons of iron, 300 million tons of copper, an equal amount of lead and over 200 million tons of zinc. These totals are well over 100 times the world's present annual rate of production. In order to power this newly industrialized society, energy would have to be produced at a rate equivalent to the burning of about 16 billion tons of coal per year—a rate roughly 10 times larger than the present one.

Such a transformation obviously will take time. It is important, then, that we inquire into the rates at which industrial growth might take place in the future. It is convenient to use as a measure the growth of the iron and steel industry, which is the backbone of modern industrial civilization. Annual steel production, which ranges from 9 pounds per person in India to about 1,300 pounds per person in the United States, provides one of the best indicators of the industrial development of a country.

In the past such growth has characteristically followed the law of compound interest, and we can thus speak in terms of a "doubling time"—the time required to double production capacity. In the early stages of expansion of the steel industry in the United States, in Japan, and in the Soviet Union, doubling times varied from five to eight years. The more rapid rate appears to be characteristic of what is now possible with proper application of modern technology. Indeed, it appears that since 1953 China has expanded her steel industry with a doubling time of less than five years.

Food production, which is linked with the production of steel, can be increased in two ways: by increasing the amount of food produced per acre and by increasing the numbers of acres cultivated. Additional increases in the amounts of food available to human beings can be obtained by decreasing the quantities of plant materials fed to domestic animals.

The amount of food produced on a given area of land depends, of course, upon the soil and upon climatic conditions. In addition, it depends upon the extent to which technology is applied to the problem of producing more food. When we look about the world we see that there are large variations in the amounts of food produced per cultivated acre. Food with an energy content of about 13,000 calories is produced on an average acre in Japan each day. The corresponding yield in Western Europe is 7,500 calories. The yield in India is about 2,500 calories. These differences do not result primarily from differences of soil fertility or of climatic conditions. Rather, they are reflections of the extent to which modern agricultural knowledge is applied specifically to the attainment of high yields.

By the proper application of technology, the agricultural areas of the world can probably be increased from the present 2,400 million acres to about 3,500 million acres. However, very little of this potential cropland is in Asia. Cultivated land area in Asia can probably not be increased by more than 25 percent.

By far the greatest potential for increased food production is in those areas where reclaimed sea water can eventually be used. Today, reclaimed sea water is too expensive to be practicable, but, as the pressures upon the land increase and as our technology improves, we will reach the time when fresh water from the sea will be used to irrigate large areas of the world.

But there is reason to expect their development to take a long time. In selected basic industries production can be doubled every few years because the construction of factories does not necessitate the concerted action of entire populations. A steel plant or a fertilizer factory can be built by relatively few persons. By contrast, the time scale for changes which involve large segments of a population has in the past been relatively long. The spread of modern agricultural techniques has been slow, in part because so many persons must be educated. Even with the application of tremendous effort, it has not been possible in the past to achieve a sustained increase of agricultural production of more than about 4 percent per year.

The Challenge

Next to the abolition of war, the industrialization of the underdeveloped areas of the world is perhaps the most formidable task confronting mankind today. Indeed, these two problems cannot be divorced from each other. Implicit in any discussion of the abolition of war is the assumption that steps will be taken to ensure that deprivation is eliminated in these areas.

A large fraction of the world's population is now starving, but there appear to be no technological barriers to the feeding of a stable world population several times the present size. Although the world population is increasing rapidly, population growth can in principle be stopped. Our high-grade resources are disappearing, but, given an adequate energy supply, we can live comfortably on low-grade resources. Nuclear and other sources of energy appear to be adequate for millions of years. Indeed, it is amply clear that man can, if he wills it, create a world in which human beings can live comfortably and in peace with one another.

A major obstacle for most countries is accumulation of sufficient capital to permit industrialization to progress at a pace commensurate with the needs. In many areas agricultural products are now being traded with industrialized countries. In some areas nonagricultural resources can be traded. If the funds received are expended wisely on projects of industrial development, solid foundations for further industrialization can be created. But many regions are not blessed with adequate resources either to feed themselves or to provide for their own internal industrial development, let alone their capacity to accumulate capital.

Without major help from the outside, it is unlikely that the underdeveloped nations can industrialize sufficiently rapidly to eliminate deprivation. Here lies perhaps the most basic challenge for a world which hopes to develop into an era beyond war. To what extent can the presently industrialized nations of the world jointly attack this problem on a massive scale?

There is an ample production capacity in the Western world to permit rapid world-wide development, were that capacity used wisely. The effort which now goes into the production of the tools of war would greatly accelerate rates of industrialization, were it transferred to the production of the tools of peace. Great increases in production capacity can be forthcoming as the result of automation, and, associated with it, increased productivity and decreased capital investment per unit of output. Moreover, one of the major problems faced by the democratic-capitalistic-industrialized nations is that of stabilizing the industrial sectors of their economies; a cooperative effort aimed at world-wide industrialization may act as a strong stabilizing force.

If concerted efforts aimed at world-wide industrial development are not made, it seems likely that totalitarianism will spread rapidly. China is already highly regimented and millions of Asians are impressed by her economic progress. We should not be surprised were India to attempt at some future time to emulate China. The pressures of eking out an existence may soon force Japan to return to the totalitarian fold. Furthermore, with modern techniques of control and persuasion, this process may become irreversible.

We know this to be a fact: it is not the lack of technical knowledge or of knowledge of the earth's resources that are the major barriers to the evolution of a world in which all individuals have the opportunity of leading free and abundant lives. The primary hindrance is man's apparent inability to devise those social and political institutions which can enable us to apply our technical knowledge at the rapid pace the situation demands. Here, no doubt, lies the greatest challenge of a future without war.

ARTHUR LARSON

Arms Control through World Law

THERE ARE TWO MAIN ELEMENTS in world law relevant to arms control: settling disputes, and ensuring compliance. This dual nature of the world law task needs stressing at the outset because the first of the two jobs, dispute-settling, is usually slighted in discussions of this kind. Too often it seems to be assumed that, if somehow we could only create a decisively powerful international police force under central control in a relatively disarmed world, the problem of achieving world law would be largely solved. This assumption contains a pair of fatal flaws.

The first flaw is this: before a police force is sent into action to deal with an international quarrel, except in the case of overt violence directly witnessed or verified by the force, there must first be a decision on who is right and who is wrong in the quarrel. Since most quarrels nowadays are the result, not of clean-cut lawless invasions, but of complex and subtle clashes of alleged rights, this settling of the rights and wrongs of the situation requires a body of principles to guide the decision and an impartial mechanism to apply the principles—both acceptable to the states affected.

The second flaw is this: a relatively disarmed world with a powerful international force is not going to come into existence except as a satisfactory dispute-settling system is developed simultaneously. Armaments have not been built up entirely out of sheer "cussedness." They have been built up, in part at least, to perform a legitimate function: that of trying to protect the state against wrongful infringements of its rights, including its right to security. It follows that we cannot merely get rid of armaments and leave a vacuum. Something has to be put in their place. In the human story that "something" has always been law.

The general approach of this essay will differ from some earlier treatments of the subject. Here the attempt will be to describe, not just an end result, but a process. That is, the primary effort will be, not to draw a blueprint of an idealized system of world law and arms control, but to inquire whether it is possible now to begin a series of gradual and phased steps that ultimately could lead to something approximating such an idealized system.

This approach is suggested by the thought that our plan for building up world law must match our plan for disarming. We reject sweeping Russian proposals for total disarmament in a few years as unrealistic. We propose gradual and phased disarmament, with the strength of the central international police force rising as the strength of national armaments falls, until the international force in effect outweighs the national. A program for achieving world law to match this arms-reduction program, then, would not be one of a sweeping revision of the United Nations Charter within a few years to create a limited World Government. Such a program, rather, must gradually strengthen the body, the machinery, and the acceptance of law for settling international differences—not before, not after, but contemporaneous with and in phase with the reduction of armaments. Consequently, just as we may envisage a world in which an international armed force will decisively outrank the national, so we may envision a world in which an international rule of law will eventually outrank national license and self-judging.

Settling Disputes

Before we can discuss how disputes should be settled in a world of law and reduced arms, we should look round and ask what kind of disputes we have to deal with in today's world. In so doing, we must distinguish actual active disputes from generalized tensions and unpleasantness between states. Strain and struggle, suspicion and exasperation, must for our purposes be taken as given quantities on the international scene. Our concern here is how to keep them from breaking the peace.

In discussions of the problem of arms control and war prevention, one often gets the impression that the actual onset of hostilities is treated as a kind of mathematical abstraction. The concept that "A attacks B" or "B attacks A" is taken as a given quantity, and various deductions and equations are then based upon this concept. (This is like a classical opening in a murder mystery: the corpse is found in the library; the murder is a given quantity; and the story proceeds from there.) Much of the elaborate analysis of deterrence and arms-control policy will be found on close examination to assume that a major attack will come about either as the result of a "pre-emptive strike" by a power which has no better reason for striking than a conviction that it has a certain ratio of military superiority, or as the result of an "accident" based on a mistaken notion that another power had launched a major attack.

Both these ways of setting off a war are within the realm of possibility and must be reckoned with, but to treat them as almost the only ways in which war starts is to give an air of unreality to discussion and planning. Most wars nowadays are set off by a specific dispute, not by a vague state of tension or rivalry. Until you identify what the nature of the dispute is, and where it is, and what countries and issues it involves, and how big it is, you cannot very well discuss either how to prevent its breaking into war or how to anticipate the form that any such war would take.

As this essay is being written, four active disputes are prominent on the front pages and in the editorial columns. The first is the Berlin crisis, which stems mainly from the right claimed by the USSR to relieve itself of its obligations by full recognition of the German Democratic Republic, and thus allegedly to destroy all Western right of access to West Berlin. The second is the Sino-Indian boundary dispute, with both sides claiming a number of frontier territories as of legal right. The third is the continued stoppage by Egypt of Israel-connected shipping desiring to transit the Suez Canal, under claim of alleged belligerent rights. The fourth is the real or threatened interference with foreign rights in Cuba. Perhaps one should add, in view of World Refugee Year, the continuing dispute about the rights of Arab refugees from Palestine. Other controversies around the world include assorted disputes over national boundaries and a number of clashes over the relative rights of co-riparians to the use of waters of international rivers.

All of these quarrels have several common features of prime significance for our purposes: they involve claims of legal rights by both sides; questions of international law are imbedded in them all—sometimes as many as a dozen; and thus in no single case could an international enforcement agency be automatically or administratively set in motion against one of the parties.

These examples should serve as a useful corrective to the commonly heard assumption that today's major disputes are all political, not legal. In one loose sense, these disputes are "political" because the parties insist on trying to solve them by political rather than legal means. That misses the point. The point is that, in their inherent nature and quality, these controversies have legal questions at their core. Of course, there are other controversies involving changes in existing legal relations that are diplomatic and political in their very nature, such as the future of Germany and the recognition of the People's Republic of China. But as to the essentially legal disputes, they are being handled by nonlegal means, not because their intrinsic nature compels this course, but because the parties do not choose to settle them by legal means. The problem is not "can't"—it is "won't." Thus, the nationalization of the Universal Suez Company gave rise to what was basically a legal dispute. It became political because of the way it was handled.

Since Hungary and Suez there has not been a case of overt and violent invasion of another's territory by force of arms. Even in these two instances the invaders made emphatic claims of legal justification: in the case of Hungary, "invitation"; in the case of Suez, "protection" of the Canal under treaty right.

Simple Invasions. The lesson seems to be that, while the problem of protection from old-fashioned open attack or overrunning of boundaries will continue to exist, it is not the largest and certainly not the hardest part of the world law task. But it is definitely a part, and we should therefore quickly take note of the specific question of how to deal with it. Let us assume that mobile units of the international force are gradually built up at key points in the world, with their strength and number increasing as arms reduction progresses. The force will have an administrative body exercising immediate control over its actions. In the case of a simple, gross invasion, reported by an inspector who witnesses it or verifies it by observation, there would be neither time nor occasion for anything other than a direct administrative decision by the force's controlling body to order the invaders to halt and retire, and to back the order by immediately moving international units to the scene.

Similarly, if an imminent offensive aerial or missile attack were detected, the right of an international force to take direct action would be clear.

Ample analogy can be found in domestic law for the distinction between this kind of peremptory administrative action in emergencies and the normal procedures of law enforcement. Thus, a police officer who sees a burglar climbing through the window of a church can on his own authority make the decision to arrest him on the spot and may use such force as is necessary. By contrast, recall the case of the two ministers who both claimed the legal right to the pulpit of a church in

Brooklyn. If the policeman on the beat had been called in, could he have made a legal decision between the two and then have arrested and detained the loser? Certainly not. The normal domestic law enforcement procedure always involves the judicial function, in the issuance of warrants, informations, indictments, and, of course, convictions and sentences.

Since the function of the police includes not only defending right against wrong, but also preventing breaches of the peace as such, an international force should also have the power, wherever violence has occurred or is imminent, to step into contested territories and prevent further clashes. Thus, just as such a force might have been able to act to stop the invasion of South Korea by North Korea, so also it might even occupy disputed areas between China and India for the sole purpose of preventing violence—recognizing that the ultimate question of legal rights in particular territories must later be settled by other means.

It would be highly desirable to work out more detailed understandings on the conditions under which virtually automatic action by an international force could take place. Secretary Herter has stressed "the need to create certain universally accepted rules of law which, if followed, would prevent all nations from attacking other nations."

Clashes of Alleged Legal Rights. Let us now see what can be done about the commoner type of quarrel involving more complex questions of legal rights. It must be stressed again that the function of a legal order here is not merely to restrain any violence that might grow out of these disagreements, but also to assure all nations that they can safely disarm because all their rights—not just their right to be free from deliberate unexcused physical aggression—will be systematically and fairly protected.

The Body of Law. The first requisite of a system of world law competent to dispose of disputes and protect rights is a body of law that is both accessible and acceptable. The present body of international law is capable of substantial improvement on both these scores. Moreover, in line with our main approach of stressing actions that can be taken now to move us gradually toward our idealized objective, we should particularly note that this improvement can be undertaken, and is being undertaken, on an increasing scale by the techniques of both research and diplomacy.

As to the accessibility of existing law: much of the principal material, such as current treaties, is reasonably available. But there is nothing in international law to compare with either the completeness or the convenience of an ordinary domestic law library, with its up-to-date digests, key-number system, elaborate cross-reference and finding aids, definitive reporting and annotation systems, loose-leaf services, and the like. The multifarious sources of customary international law in particular are scattered and unorganized. The same is largely true of international law decisions to be found in opinions of national courts throughout the world. The prosaic task of simply finding and publishing and adequately indexing the law we already have may seem a far cry from visions of a world living under law. But how can you live under law if you cannot find out what it is?

Even if all the existing law were accessible, this would be only a start. The larger part of the task is to develop a body of law acceptable to more than ninety nations. International law as we know it is largely the handiwork of Western Christendom. Many states do not think of it as *their* law, but rather as a legacy from the days of imperialism. It there anything we can do—and do now—about this?

A solution sometimes proposed is to create an international legislative body comparable to Congress, to pass binding international laws. People favoring this course sometimes ask, "How can you have world law if you have no world legislature?" Such people are surprised to learn that by far the greatest part of Anglo-American law was not the product of legislation at all, but of judicial decision. In any event, since our approach calls for actions that can be initiated now in phase with gradual disarmament, we must face the fact that states are not going to agree to a general world legislature in the foreseeable future. The distinctive feature of legislation, as distinguished from making new law by multilateral treaty, is that the treaty binds only those who agree to it, while legislation can bind a minority over its protest. Does anyone seriously suppose that today's nations, including our own, would entrust the changing of their basic legal rights to legislative action by any coalition of other states that might be able to assemble the necessary voting majority?

There are three major sources of law specified in the Statue of the International Court of Justice. These are customary law, treaties, and the "general principles of law recognized by civilized nations." It is the last two that hold the greatest promise for our purposes, because their acceptability is built into them.

The reference to "general principles" seems to mean this: if you can delve into the basic legal principles developed within the major legal systems—such as Common Law, Civil Law, Islamic, Hindu, Jewish, Chinese, Japanese, African, and Soviet—and find a common element, that common element becomes elevated to the status of international law. The tentative conclusion reached by Wilfred Jenks in his book, *The Common Law of Mankind,* is that there is a surprising degree of consensus among these systems on the great principles relevant to international peace, such as the principles that the sovereign is under the law, that disputes must be decided through independent third-party adjudication, that the right of self-defense is subject to certain defined limitations, that agreements must be kept and are released only in a small number of named situations, that acquired rights (with some exceptions) are to be protected, that there is a duty to consult before acting to affect the rights of others adversely, and that harm to others without justification is a legal wrong. Beyond these broad principles, there are many others that are more specific.. For example, the Duke University project on illegal propaganda is investigating the possibility of applying such general principles as the wrongfulness of using words to harm, and the culpability of incitement to harm, to the problem of international propaganda.

The acceptability of this source of law lies in the fact that, when you cite it, you are not shoving alien concepts down the throats of countries who had nothing to say about forming those concepts; rather, you are merely reminding them of their own deepest legal traditions. The difficulty with this source—and it is not an insuperable one—is that an immense amount of far-flung research is obviously necessary if these general principles are first to be distilled from the many different systems, then analyzed and compared to find a true consensus. Semantic difficulties abound, and one must constantly ask whether apparently similar words really mean the same thing. This is a rich opportunity for present research, and at least two law schools, Cornell and Duke, have launched several projects in this area.

Treaties as a source of law also enjoy the advantage of inherent acceptability for the obvious reason that they are the product of the voluntary act of the party bound. This point is of particular interest when the question is raised of acceptability of world law to Communist countries. Andrei Vyshinski has written: "The Soviet theory of international law considers treaties . . . to be the main source of international law. Their legal significance and validity must be unconditionally observed."

The more we can, through energetic diplomacy, blanket troublesome new areas of international relations with law-making treaties, the more we shall increase the chances of creating a body of law that is both made to order for current needs and endowed with maximum prospects of acceptability. We already cover large segments of activity in this way—civil aviation, postal service, narcotics and white-slave traffic, patents and copyrights, and so on. Recently, a good start was made on an agreed regime in Antarctica. In the same way, without waiting for an international legislature, we should be getting on with possible codes on Atomic Energy, International Propaganda, Space Law, the Law of International Rivers, protection of private international investment, and a number of other current fast-moving subjects.

Indeed, the British have suggested that what we need most now is a "code of co-existence" which would define in precise form those activities of states which would no longer be permitted, such as hostile propaganda, economic warfare and subversion.

The creation of new law through treaties should be accompanied by the clarifying of existing law through codification and restatement. This is primarily the responsibility of the International Law Commission of the United Nations. This Commission has had some successes and many frustrations. Its work could be facilitated in a number of practical ways not involving any Charter amendments, including such obvious and down-to-earth changes as putting the members on a full-time basis with adequate funds at their disposal to hire staff and handle efficiently the volume of complex work expected of them.

What is most directly relevant to the present analysis, of course, is a disarmament treaty. Indeed, if we could only postulate a highly intelligent self-interest in each of the parties, such a treaty, in addition to its enormous intrinsic value, might have the added value of being the vehicle by which an unusual advance is accomplished in dispute-settling under law. The hypothetical process could run as follows: hypothesis 1, all parties sincerely want a disarmament treaty that works; hypothesis 2, all parties are wise enough to realize that, as Louis B. Sohn points out in the opening passages of his paper, "Adjudication and Enforcement in Arms Control," a disarmament treaty will work best if it has an impartial dispute-settling mechanism built into it to handle controversies on interpretation.

If this kind of clause were tried in a disarmament treaty and if it worked well, it could be extended to more and more treaties until a considerable part of international relations had been effectively brought within an orbit of impartial adjudication under law.

The Machinery of Law. So far we have considered the body of world law, and have examined ways in which it could be gradually strengthened, diversified, modernized, and made more universally acceptable, without waiting for any dramatic change in world organization. But how about the machinery of world law? Can this too be strengthened, diversified, modernized, and made more universally acceptable by a gradual process that is within the realm of reasonable possibility? The answer is that it can.

There is now only one court of general international jurisdiction, the International Court of Justice at the Hague, which is the judicial arm of the United Nations. As matters now stand, it is as if, in domestic law, you had to run to the Supreme Court every time you had a dented fender or a back alimony claim. Of course, with the present scarcity of business in the Court—about one and one-half contentious cases are decided per year—the awkwardness of having only one such court does not make itself seriously felt. But we are assuming that, as disarmament progresses, and as the body of world law is built up, resort to judicial settlement will increase—if convenient judicial tribunals are available.

As a blueprint for an ultimate optimum system, to be accomplished by an intelligent revision of the United Nations Charter, the judicial, arbitral, and conciliation structure set forth in Clark and Sohn's *World Peace through World Law* would be difficult to improve upon. Since the present essay attempts to begin with steps that can be taken at once, and since the assumption of an extensive revision of the United Nations Charter in the near future does not seem a realistic one, the effort will be to show first that considerable diversity and flexibility could be gradually achieved within the present Charter and Court Statute if certain statutory sections were exploited to the full.

Article 26 of the Statute provides:

> The Court may from time to time form one or more chambers, composed of three or more judges as the Court may determine, for dealing with particular categories of cases.

Thus, a panel of three or five could be set up to handle all interpretation disputes under a disarmament treaty. Again, since the Court can sit anywhere in the world, presumably it could assign particular panels to sit from time to time in different regions of the world, and thus approximate the regional court system that many people have urged. This same freedom to travel would even permit the Court or its panels to ride circuit and thus increase its accessibility even more.

Article 50 of the Court's Statute states:

> The Court may, at any time, entrust any individual, body, bureau, commission, or other organization that it may select, with the task of carrying out an enquiry or giving an expert opinion.

This opens vast possibilities for dealing with a large volume of detailed business. It is a familiar experience in administrative law to find that the bulk of the business is disposed of at various stages of fact-finding and opinion-rendering by referees, hearing examiners, masters, and assessors. By a skillful use of this Article, the Court could, if the amount of business required, in effect set up the equivalent of a hierarchy of lower courts, the only difference being that the lower bodies could only render opinions and not judgments. But for a large proportion of litigants, an adverse fact-finding or expert opinion is a sufficient signal to induce retiring from the field. Under a disarmament treaty, such a system could be used to handle detailed controversies of interpretation in the first instance, right in the region.

Article 41 of the Statute provides:

> The Court shall have the power to indicate, if it considers that circumstances so require, any provisional measures which ought to be taken to preserve the respective rights of either party.

Thus, the Court can issue the equivalent of a temporary injunction to stop an alleged disarmament violation, for example, pending a more complete hearing on the merits.

This, then, is a sampling of the possibilities for finding variety and flexibility within the present constitutional framework of the Court. These and similar moves, supplemented when appropriate by special tribunals outside the United Nations, such as the Court of the European Economic Community, should make it possible to achieve a large part of the desirable improvement in world judicial machinery, even prior to the time when a more perfect structure can be achieved through a revision of the United Nations Charter.

If these various expedients were reasonably successful, the "habit of law" would gradually increase to the point which would make constructive United Nations Charter revision more realistically possible than it now is. As states become accustomed to the advantages of a convenient and impartial settlement of disputes, they will more readily favor building into the structure of the United Nations Charter those advantages which under the gradual process were worked out by comparatively makeshift means.

This is not unlike the evolutionary process of change by which the United Nations has been transformed in other respects: the growth of the function of the Secretary-General; the creation of the small police force; and the enhanced role of the General Assembly, including the device of the investigatory commission, employed in the Laotian case. Just as any future United Nations Charter revision might well ratify and incorporate these *de facto* changes, so it might also incorporate and improve upon the changes in the scope and variety of dispute-settling mechanisms worked out within the present Charter and Statute.

It is to be hoped that the confidence in international tribunals created during the first stage of growth here described would permit the members of the United Nations to accept the more complete and regular kind of judicial, arbitral, and conciliatory system described by Clark and Sohn. This system (which should be studied in its full form in *World Peace through World Law,* if justice is to be done it) includes: a revised and strengthened International Court of Justice; a World Equity Tribunal to hear cases that cannot be settled on essentially legal principles; a World Conciliation Board to help the parties to arrive at voluntary settlements, whether legal or nonlegal, by the techniques of mediation and conciliation; Regional Courts of the United Nations, whose jurisdiction would extend, among other items, to certain international offenses of private parties and to questions of inspection under arms control, and from which appeals would lie to the International Court of Justice; a United Nations police force; and an Attorney-General of the United Nations, who would have the responsibility for the prosecution of offenses and for the general direction of the police force.

Up to this point, the conclusion is that, if we first make the most of the opportunities now realistically available to us, we can steadily build up both the body and the machinery of world law in such a way as to set the stage for the eventual acceptance of an optimum system of world law, and at every step of the way we can gradually transfer to law the function of protecting legitimate national rights, and so permit nations, with growing confidence, to reduce their national armaments.

Ensuring Compliance

Now that we have examined the problem of settling who is right and who is wrong—which nation shall feel the lash of international enforcement, and which nation shall sit by, wearing the smile of vindicated righteousness—we are entitled to consider the process of enforcement itself. One or two observations should be made to place this element in proper perspective. The first is that the part to be played by physical force in the attainment of compliance with world law is probably not as great as is usually supposed. There is only one recorded case of disobedience to a final judgment of the International Court of Justice; and among the hundreds of arbitral decisions and thousands of other decisions of international tribunals, there is only a handful of cases in which any question of noncompliance can be found. The lesson seems to be that, if we can obtain acceptance of the body of law and of the machinery of law by the nations affected, compliance will generally follow. In other words, once a country has so far accepted the body of law and the tribunal as to entrust a case to it, it is "in so deep" that noncompliance with the decision finally rendered becomes unthinkable.

The second observation is that physical force is only one item in the armory of sanctions for compliance with law. The enforcement measures now available include diplomatic pressures, economic measures, attachment of property belonging to the debtor state, enforcement through national courts, various kinds of enforcement through international organizations, and enforcement measures under international arrangements apart from the United Nations. A good example of a device of obvious potency for inducing compliance without the use of force is that of the International Civil Aviation Organization. If its Council finds that a member nation has refused to comply with a final decision of the International Court of Justice or of an arbitral body, the contracting states undertake not to allow the airlines of the offending state to operate in their territory. A more crushing sanction could hardly be imagined. This sanction is the equivalent of a death sentence for the international air commerce of the recalcitrant state. The availability of such measures as this should serve as a reminder that the strengthening of enforcement of world law should proceed, not just through the strengthening of methods employing force, but equally through the strengthening of every other kind of diplomatic, economic, and collective pressure that can be devised. The Collective Measures Committee of the United Nations has indicated in its reports some of the ways this strengthening could be accomplished.

The nature of a possible international security force remains to be considered. Any attempt at picturing such a force at this point in time must necessarily be viewed as merely illustrative of what could conceivably be done, since details about the size, composition, and disposition of such a force will in fact depend upon a host of variables which cannot now be settled.

The idea of an international military force is not entirely new. As long ago as 1910, the United States Congress, in 36 U.S. Statutes at Large 885, suggested creating a commission which would study "constituting the combined navies of the world [into] an international force for the preservation of universal peace" in connection with arms limitations. In 1919, a joint military force under an international general staff was proposed by the French government, and the suggestion was renewed in more detailed form by the same government in 1932, in both instances in connection with disarmament proposals.

At the Dumbarton Oaks Conference in 1944, both the Soviet Union and the Chinese delegation called for an international air force. The result was a provision in Article 45 of the Charter, which obliges member states to "hold immediately available national air force contingents for combined international enforcement action." The Charter provides for national contingents for international enforcement action, but this obligation was to arise only upon the conclusion of special agreements, and these agreements have never been made. As a result, the United Nations forces assembled for action in Korea in 1950 and in the Middle East in 1956 were not the result of a regular advance creation of available contingents. The Korean force became largely the responsibility of the United States to assemble from among nations willing to contribute. The Middle East force was largely made up of contingents furnished by nations with relatively small military forces.

An international armed force for a world of disarmament and world law would have to be quite differently constituted from either of these. As to the size of such an ultimate force, the common-sense formula now being advocated by the United States is this: the size of national armaments should be gradually reduced, and the size of the international armed force should be gradually increased, until the point is reached at which the strength of the international force is superior to that of any nation or combination of nations with which it might reasonably be expected to have to deal. This formulation indicates that the size of the international security force cannot be stated in absolute terms, but will depend on the relative size of national armaments at any given point. Theoretically, an absolute limit beneath which national armaments cannot be expected to fall might be stated, since a certain minimum would always be considered appropriate for the maintenance of internal order. As for adding up the combined strength of the combinations of nations that might have to be dealt with, this does not mean that the central force would have to be greater than the forces of all of the countries in the world combined. A common-sense judgment would have to be made on realistic possible aggregations, and the size of the international force calculated accordingly. It has been estimated that, on the assumption of a reasonably successful disarmament process, the size of the international force might ultimately be around 500,000.

Because of the potential idealistic appeal of this kind of force, coupled with the provision of good salaries and incidental benefits, it should be possible to staff such a force with young people of high quality, without the necessity for any kind of international selective service. The distribution by nationalities should be such that no single nation would have more than a very small percentage of the force represented. The nationalities should not be clustered into separate units, but should be commingled throughout the force, for obvious reasons. Similarly, the command structure should be subject to regular rotation among nationalities. The force should be stationed at its own bases at strategic points around the world. It should be liberally equipped with air-transport facilities, paratroop equipment, and other aids to mobility, because of the unusual importance of its ability to reach trouble spots promptly.

The planning for the size and composition of the international force must constantly look in two directions. It must aspire to sufficient size and effectiveness to do the job assigned to it. On the other hand, it should be so adjusted, both as to size and as to detailed constitution, that it will not give rise to fears of a Frankenstein monster that will take over the world. Although superficially the postulated mathematical preponderance of strength in the central force might seem to lend some support to such fears, a closer look at the realities of such a situation will serve to dispel them. The force would be made up of people drawn from dozens of nationalities, all of whom expect to serve for a limited time and then resume their normal lives and friendships in their home countries. Such people are going to have small appetite for becoming the hated tools of some power-mad potential world dictator. Moreover, the force will be widely scattered geographically, and will have a rotating command; thus, having no single national industrial base to support it, it will be incapable of any sustained autonomous activity.

A force of this size and character could presumably be built up gradually without a revision of the United Nations Charter, since we have the precedent of the Middle East force to build on. As indicated earlier, under the Clark and Sohn proposal such a force would be subject to the direction of an Attorney-General. Until such an office is created by amendment to the Charter, it might be desirable to have the staff of the force responsible to the Secretary-General, who is in the logical position to take executive action. The United Nations Charter now contains in Article 94(2) a permissive provision under which a party seeking enforcement of a decision by the International Court "may" apply to the Security Council, which then "may" make recommendations or decide upon measures—which might include using the security force. Although the point may be debatable, this vague permissive procedure ought not by implication exclude other enforcement procedures for which general authority may be found in the Charter.

So far, we have contemplated the use of an international force only when there has been (a) an administrative decision to stop an overt invasion actually observed, and (b) an authoritative determination of rights by the impartial dispute-settling structure.

For this reason, it seems possible to entrust its direction to an officer such as an Attorney-General or Secretary-General. The range of policy decision or discretion will have been reduced to the minimum by the precise rules governing automatic action by the force and by the assumption of responsibility by the dispute-settling mechanism in less precise situations. Conceivably, a political body, such as the Security Council or General Assembly, should have the power to overrule the officer and stop action by the force. But should there be, in addition, the possibility of initiating action by the international security force through a decision of a political body? The only important type of case in which this might seem appropriate would be the necessity of dealing with some outlaw nation or group not a party to the system of disarmament and law which this discussion assumes. In relation to such a troublesome outsider, the disarmament collectivity would be somewhat in the position of a sovereign nation which must necessarily decide the question of a declaration of war by political means. But in relation to the members of the collectivity, the situation is entirely different. To apply central force to them as a result of political decision would be comparable to the bill of attainder and other ancient attempts by nonjudicial domestic bodies to arrogate to themselves the right to apply punishments directly by vote of a deliberative assembly. The hazards of entrusting this power to a political body are somewhat the same as the hazards which made the bill of attainder and similar procedures anathema to our sense of fair play. No matter how the present imperfect voting system might be revised, is there any great likelihood that assurances satisfactory to United Nations members can be devised against the fear that some kind of political coalition of nations might "gang up" on a minority and enforce its will through the use of the international security force?

Conclusion

It is a good thing, even at this early stage of arms-control discussion, to hold up a picture of the system of world law and arms control toward which we would like to strive. This is useful to give direction to our efforts, and it is useful to enlist the support of people everywhere who are eager for a plan that is full of hope and daring. But it must not be a plan that reminds us of that oldest of all jokes, the story of the farmer who, after several futile attempts to give directions to a motorist, concludes, "Mister, you can't get there from here."

This essay, then, has tried to depict a world of law and how to get there from here, in such a way as to satisfy the aspirations of the strife-weary without offending the common sense of the tough-minded. At this point, someone may once more cite Lloyd George's dictum that the most dangerous thing in the world is to try to leap a chasm in two jumps. That depends. If the longest distance you can leap is fifteen feet, and if the chasm is a hundred feet across, one leap can be rather dangerous too, and it might be better if you walked down and climbed up a step at a time.

Selected Critical Bibliography

Compiled and Annotated by CHRISTOPHER WRIGHT

THE DISCUSSIONS of arms-control problems cited below suggest five major lines of inquiry emphasizing respectively: (i) national security and military strategy, (ii) the implications for mankind of national strife with modern weapons, (iii) techniques of control, (iv) domestic and international negotiations, and (v) the economic, legal, and other implications of arms-control mechanisms.

Those discussions relating most specifically to consideration of each of these lines of inquiry can be grouped respectively as follows:

(i) 21, 24, 31, 39, 63, 71, 72.
(ii) 32, 51, 52, 62, 65, 70.
(iii) 1, 9, 15, 17, 27, 46, 54.
(iv) 28, 34, 35, 41, 50, 55, 60.
(v) 9, 38, 59.

The study of arms control has been uneven in its emphasis and too often obscured by an uncritical assumption of incompatibility between military security and arms control, of compatibility between arms control and disarmament, or of the immediate peaceful benefits to be derived from the control of known weapons. Important studies of these subjects are now under way which may considerably enhance the bibliography of arms-control literature. Those discussions which are now most directly relevant to the study of nuclear-arms control because of their official character, timeliness, completeness, or exclusive devotion to an important aspect of the subject are marked with an asterisk.

Outstanding among groups studying arms control is the United States Senate Subcommittee on Disarmament of the Committee on Foreign Relations, which has published documents covering many aspects of arms control and reflecting the views of many experts and policy makers. Entry 9 is of particular relevance to most lines of inquiry. The Joint Committee on Atomic Energy of the United States Congress is also publishing hearings on technical aspects of a supervised nuclear-weapons test ban.

Abstracting journals, bibliographies, or general sources of ideas and information concerning arms-control studies or activities are referred to in 20, 30, 33, 52, and 64.

A. *Public Documents*

Unless otherwise noted, all documents are printed in Washington, D.C., by the United States Government Printing Office.

* 1. Department of State. *A Report on the International Control of Atomic Energy.* Department of State Publication 2498, 1946. 61 pages.

This is the "Acheson-Lilienthal Report," which initiated extensive studies and discussions on technical means for controlling nuclear-weapons production. The relation of these control requirements to the political requirements which must complement them is illustrated in the following two State Department publications.

* 2. —— *International Control of Atomic Energy: Growth of a Policy.* Department of State Publication 2702, 1946. 281 pages.

* 3. —— *International Control of Atomic Energy: Policy at the Crossroads.* Department of State Publication 3161, 1948. 251 pages.

These two publications are informal, summary records of policy developments between 6 August 1945 and 17 May 1948.

* 4. —— "Text of Antarctic Treaty," *The Department of State Bulletin.* Vol. XLI, No. 1069 (21 December 1959), 914-917.

This treaty, initialed by twelve nations, including the United States and the Soviet Union, on 1 December 1959, prohibits any measures of a military nature in Antarctica (Article I) and any nuclear explosions except by special agreement (Article V), and provides for routine reporting of activities and for inspection of facilities by special observers with complete freedom of access in Antarctica.

5. Executive Office of the President, Disarmament Staff. *Reference Documents on Disarmament Matters: Background Series* [D1-D65], 1956-1958. *ca.* 500 pages.

This series of documents consists primarily of UN and Congressional resolutions, public statements by the Secretary of State and letters exchanged by President Eisenhower and Marshal Bulganin. Consult the *Department of State Bulletin* and *The New York Times* (indexed under Armaments Control) for similar documents produced since 1958.

* 6. United Nations Atomic Energy Commission. Part IV, "First Report on the Scientific and Technical Aspects of the Problem of Control." *Official Records: First Year Special Supplement: Report to the Security Council,* pp. 20-42. Lake Success, New York, 1946.

The Scientific and Technical Committee of the UN Atomic Energy Commission was composed of experts from different nations including the United States and the Soviet Union. It

issued reports on the technical feasibility of and procedures for effective control of atomic energy activities.

The official records and reports of the UN Atomic Energy Commission, the UN Disarmament Commission, the Commission for Conventional Armaments, and other UN groups record many attempts by members of the United Nations to discover workable methods of increasing world security by controlling atomic energy facilities, levels of conventional armaments, traffic in arms, nuclear bomb tests, military uses of such regions as outer space and the creation of an international police or peace force.

Some of the major UN documents are contained in other collections (8, 11, 14, and 15).

7. United Nations. "Disarmament and the United Nations: An Unremitting Effort," *United Nations Review*, IV, No. 6 (December 1957). 30 pages.

* 8. United States Senate, Subcommittee on Disarmament of the Committee on Foreign Relations. *Disarmament and Security: A Collection of Documents, 1919-1955*, 1956. 1035 pages.

This collection includes many United Nations documents, national documents, and selected references to other sources of official documents, to books, and to articles. It includes a section on control and reduction of armaments with the documents categorized according to their relevance to the general problem of disarmament; to technical problems such as chemical and biological warfare, atomic energy, and nuclear-weapons tests; to inspection, control, and phrasing in disarmament; to control of arms, ammunition, and strategic materials; and to regional problems such as ex-enemy states, Europe, the Far East, the Middle East, and Latin America.

* 9. ——— *Control and Reduction of Armaments* (published in 32 sections), 1956-1958.

This publication consists of 10 staff reports, 4 subcommittee reports, and transcripts of hearings held from 1956 to 1958 and printed in 17 parts plus a separate index.

The staff studies consider disarmament policy formation (No. 1), diplomatic (Nos. 2 and 3) and technical background (No. 4), including a survey of expert opinion on seismic detection of explosions (No. 10), and special regional problems (Nos. 5, 6, 7, and 9), including the attitudes of Soviet leaders towards disarmament (No. 8).

The hearings include comments and prepared statements from many private individuals and public officials who have concerned themselves with disarmament matters. Such disarmament subjects as arms races, inspection, police forces, economic consequences, moral consequences, Communist China, nuclear-bomb testing, and the "Fourth Country" problem were extensively discussed in the course of 1615 pages of testimony and can be located with the help of the index.

The reports of the subcommittee discuss political and security problems, appropriate limits for arms-control agreements, agree-

ments concerning nuclear-bomb tests and surprise attack, and the formation and organization of disarmament policy.

* 10. ——— *Controlling the Further Development of Nuclear Weapons: A Collection of Excerpts and a Bibliography*, 1958. 54 pages.

Both the excerpts and the bibliography are divided into three parts concerned with (i) political and strategic implications of further development of nuclear weapons, (ii) control and inspection, and (iii) the biological aspects of radioactive fall-out.

* 11. ——— *Disarmament and Foreign Policy* (in 2 parts), 1959. 480 pages.

These documents contain testimony by officials concerning the arms-control negotiations, and by scholars and officials on the problem of Communist China. Also included is the report of the 1958 conference of experts to study the methods of detecting violations of a possible agreement on the suspension of nuclear tests.

12. ——— *Testimony of John A. McCone on Geneva Test Ban Negotiations*, 1959. 32 pages.

13. ——— *Handbook on Arms Control and Related Problems in Europe*, 1959. 56 pages.

A summary of proposals on German reunification and demilitarization.

14. ——— *United Nations Action on Disarmament*, 1960. 14 pages.

This is a survey of the debate and resolutions of the 14th Session of the General Assembly (September-November 1959), concerning proposals for general and complete disarmament, nuclear testing (including French tests in the Sahara), and the dissemination of nuclear weapons.

* 15. ——— *Technical Problems and the Geneva Test Ban Negotiations*, 1960. 85 pages.

This document includes testimony by officials and also the Report (December 1959) of Technical Working Group Two of the Geneva Test Ban Conference and the Annexes, in which experts from the several nations display their disagreements. A list of the proposed and agreed parts to a treaty (as of 20 January 1960) is also included. Texts of these parts are released by the Department of State.

B. Books and Articles

16. Advisory Committee on Science and Technology of the Democratic Advisory Council. "Defense, Disarmament, and Survival," *Bulletin of the Atomic Scientists* (*BAS*), XVI, No. 4 (April 1960), 137-8, 144.

A statement advocating international disarmament as a major national goal, and suggesting specific problems that must be solved. See also "Nuclear Testing" by the same group in *BAS*, XVI, No. 3 (March 1960), 109.

* 17. Berkner, Lloyd V. "President's Page," *Transactions: American Geophysical Union*, XL, No. 3 (September 1959), 211.

The chairman of the Panel on Seismic Improvement appointed in 1959 by the President's Special Assistant for Science here suggests that the Geneva negotiations on the cessation of nuclear testing "point up sharply the inordinate cost to man's welfare of neglect of any part of the sciences of the earth." On pages 212-221, Frank Press presents a summary of the "Berkner Report" in which the Panel members outlined the requirements for improving fundamental research in seismology and hence improving techniques for detecting and identifying underground explosions.

18. Brennan, D. G. "Why Outer Space Control?" *BAS*, XV, No. 5 (May 1959), 198-202.

Possible control agreements and the technical feasibility and cost of control are discussed. The lack of serious planning for such agreements is noted.

* 19. Brodie, Bernard. *Strategy in the Missile Age*. Princeton: Princeton University Press, 1959. 423 pages.

The analysis of arms-control measures developed by Schelling (63) is here (pp. 299-304) placed within a discussion of the policy of deterrence which in turn is part of a penetrating analysis of the interdependence of contemporary statesmanship and military strategy.

* 20. *Bulletin of the Atomic Scientists*. Vol. I (1945) and following.

Since its first volume in 1945, the *Bulletin* has devoted considerable space to discussion of nuclear-arms control and disarmament. "News Roundup" is a regular feature covering arms-control efforts as well as other matters. Some official reports are printed, as are relevant statements by political parties and by participants in the "Pugwash" meetings of individual scientists from different nations, including the United States and the Soviet Union. Many natural scientists, social scientists and public persons have used the *Bulletin* as a forum for the analysis and debate of arms-control issues.

This bibliography mentions selected articles published in the *Bulletin* since 1958 but, for practical reasons, and with only one exception, none before 1959.

* 21. Burns, Arthur Lee. *Power Politics and the Growing Nuclear Club*. Policy Memorandum No. 20. Princeton: Center of International Studies, 1959. 20 pages.

Some of the theoretical strategic implications of a world with small nuclear powers are considered. It is pointed out that some nations may be in a favorable position to acquire nuclear arms without having to make them, that there may be disadvantages for a nation having such arms, and that distinctions must be drawn between full membership in the club, the capacity to trigger war, and the capacity to dominate a region by means of a "junior atomic club."

22. ——— "Disarmament or the Balance of Terror," *World Politics*, XII, No. 1 (October 1959), 132-145.

This article highlights the need for recognizing the choice between, and possible combinations of, programs of deterrence and disarmament.

23. ——— *The Rationale of Catalytic War.* Research Monograph No. 3. Princeton: Center of International Studies, 1959. 20 pages.

In analyzing the possibility of mischief-making by a third nuclear power, it is concluded that "public access to each other's warning systems would notably reduce the possibility of a catalytic war's being brought about by double deception."

* 24. ——— "A Graphical Approach to Some Problems of the Arms Race," *The Journal of Conflict Resolution*, III, No. 4 (December 1959), 326-342.

A theoretical analysis of the arms race, which indicates that the theory of security with the aid of military technology and the theory of peace through limitation of arms are aspects of a single, but by no means simple, subject.

* 25. Calder, Ritchie. "The Non-Nuclear Club," *BAS*, XVI, No. 4 (April 1960), 123-126.

A description is provided of the views of Blackett and others concerning Europe's position and strategy in the arms race and the *de facto* shift to a policy of unilateral missile disarmament.

26. Cavers, David. "The Challenge of Planning Arms Control," *Foreign Affairs*, XXXIV, No. 1 (October 1955), 50-66.

A summary of major considerations affecting the progress of arms control.

* 27. Clark, Grenville and Sohn, Louis B. *World Peace Through World Law.* Cambridge: Harvard University Press, 1958. 540 pages. See especially Annex I (Disarmament), 203-299.

An attorney and a professor of law here set forth a comprehensive and detailed plan for the maintenance of world peace by use of a UN Peace Force and enforced disarmament. Total and universal national disarmament is seen as the only viable permanent solution regardless of the short-term utility of a balance of terror. Emphasis is placed on a powerful inspection service and on the strength of the Peace Force relative to any national forces. Plans are presented for a two-year preparatory stage, involving a census of arms, and a ten-year sequence of proportional arms reductions. The proposed revisions of the United Nations Charter are the result of extensive private discussions and are intended to promote further discussion and recognition of the sorts of details which the authors think will have to be dealt with if truly effective institutions for the prevention of war are to be established.

* 28. Collart, Yves. *Disarmament: A Study Guide and Bibliography on the Efforts of the United Nations.* The Hague: Nijhoff, 1958. 110 pages.

This study, prepared for and published under the auspices of the World Federation of United Nations Associations, is particularly valuable because of its attempt to present an impartial summary of the positions of various nations. After describing three phases of active negotiations, on control of atomic energy and limitations on conventional armament, on over-all disarmament, and on direct great-power negotiations, it is concluded that no lessening of international tension and mistrust has taken place. Proposals have shifted with the times and circumstances; but if agreement on objectives ever seemed close, serious disagreements on suitable procedures and particularly on means of control and methods of inspection would remain. Collart suggests that the lack of success can be accounted for by the national interest in maintaining a military advantage or in overcoming a disadvantage. Nevertheless, the negotiations provide a means for international contact while informed public opinion is developed and the burden of the armaments race becomes more apparent. A bibliography of major UN documents on disarmament is included.

29. Cory, Robert H., Jr. "International Inspection: From Proposals to Realization," *International Organization*, XIII, No. 4 (Autumn 1959), 495-504.

This article points out that difficult and important problems concerning recruitment, training, and financing will have to be thought through and solved if even a bomb-test detection network such as that proposed by the conference of experts in Geneva in 1958 is to be established and maintained. The likely increased importance of complex multilateral negotiations concerned with technical matters but carried on in a political context is also recognized.

* 30. *Current Thought on Peace and War.* Vol. I, No. 1 (Winter 1960) and following.

This quarterly digest, first published in the Winter of 1960 by the Institute for International Order, New York, contains helpful summaries of much of the relevant current literature and research on arms control.

31. Dyson, Freeman J. "The Future of Nuclear Weapons," *Foreign Affairs*, XXXVIII, No. 3 (April 1960), 457-464.

A noted American physicist suggests that politically and militarily significant advances in weapons technology, such as small fission-free fusion bombs and the concealment of explosions, make international control of all nuclear operations, or else no arms control, preferable to and less illusory than controls based simply on the remote detection of nuclear explosions.

32. Fifth Pugwash Conference. "On Biological and Chemical Warfare," *BAS*, XV, No. 8 (October 1959), 337-339.

This is a statement urging the need for controls to prevent biological and chemical warfare. No proposals for achieving this objective are included.

* 33. "Focus on Problems of Disarmament," *Intercom*, I, No. 9 (November 1959), 10-28.

This issue of the information bulletin published by the World Affairs Center for the United States (New York) has as its special focus a valuable guide to the literature and activities, both official and private, concerned with problems of disarmament or with furthering disarmament efforts.

34. Fox, William T. R. "International Control of Atomic Weapons," in *The Absolute Weapon.* Bernard Brodie, ed. New York: Harcourt, Brace, 1946. pp. 169-203.

    This early analysis of the difficulties of controls anticipated the likelihood of a generation or longer of emphasis upon security through deterrence and the problems this would entail.

35. —— "Atomic Energy and International Relations," in *Technology and International Relations,* pp. 102-125. William F. Ogburn, ed. Chicago: University of Chicago Press, 1949.

    It is suggested that an ineffective international arms-control program may be worse than no controls. The need for proceeding effectively with the limited control mechanisms which may be available, without introducing utopian requirements, is also pointed out in this early assessment of the place of atomic capabilities in international relations. This astute analysis of the political and military realities suggests that "neither total war nor total peace is inevitable." The possibility was anticipated of "protracted bad relations, ultimately perhaps followed by slow improvement."

36. Freeman, Harrop A. and Yaker, Stanley. "Disarmament and Atomic Control: Legal and Non-Legal Problems," *Cornell Law Quarterly,* XLIII, No. 2 (Winter 1958), 236-261.

    This article outlines many of the issues discussed extensively by Henkin, but it also identifies a number of legal problems of a more international character and indicates the range of proposals for arms-control agreements and procedures.

37. Frye, William R. *A UN Peace Force.* Public Affairs Pamphlet No. 257. New York: Public Affairs Committee (in collaboration with the Carnegie Endowment for International Peace), 1957. 28 pages.

    A discussion of the experience of the UN Emergency Force in the Near East and the future role of such forces. Emphasis is placed on the psychological and symbolic role of such forces in preventing armed violence.

* 38. Henkin, Louis. *Arms Control and Inspection in American Law.* New York: Columbia University Press, 1958. 289 pages.

    This book represents a unique effort to anticipate in detail some of the domestic implications of a hypothetical international inspection procedure sanctioned by treaty and implemented by appropriate congressional legislation. The legal implications of inspection are explored, using as a basis the postulate that inspection will be used to help control limitations on some types, quantities, and dispositions of arms and will require free access to installations and records and the use of any known methods

of surveillance. It is concluded that adequate inspection procedures can be carried out under federal auspices and will neither do violence to the Constitution nor noticeably alter the present types of relationships between individuals or private groups and government agencies or regulations. It is recognized that the policies and activities of the Federal Government would have to be modified, particularly with respect to secrecy and security.

39. Huntington, Samuel P. "Arms Races: Prerequisites and Results," in *Public Policy: Yearbook of the Graduate School of Public Administration, Harvard University*, pp. 41-86. Carl J. Friedrich and Seymour Harris (editors). Cambridge, Massachusetts: Graduate School of Public Administration, 1958.

In this study of arms races and disarmament it is recognized that technical problems and political problems cannot be resolved independently. An important distinction can, however, be drawn between quantitative and qualitative arms races. Of the two types, the former is most likely to lead to war or to economic pressures to abandon the race and seek an arms agreement limiting quantities of arms. Qualitative arms races do not create the same pressures and may serve to maintain a reasonably stable competitive situation provided sufficient technical inventiveness is exercised. It is suggested that agreements limiting the qualities of arms would enhance a quantitative arms race and hence the chances of war.

* 40. Inglis, David R. "Allaying Suspicions of Test Ban Controls," *BAS*, XV, No. 10 (December 1959), 425-426.

A brief outline of the ways in which the technical design of a nuclear-bomb test-ban control system can be adjusted to accommodate different types of suspicions without necessarily jeopardizing the sensitivity of the system.

* 41. Jessup, Philip C. and Taubenfeld, Howard J. *Controls for Outer Space and the Antarctic Analogy.* New York: Columbia University Press, 1959. 379 pages.

This study explores the precedents and possibilities for finding viable international solutions to the problem of preventing the extension of the arms race to outer space and Antarctica. Account is taken of the existing and anticipated techniques required to exploit these regions for various purposes. It is concluded that broad international controls would be useful and feasible. Emphasis is placed on the requisite political conditions for agreement and on creating conditions for optimum noncompetitive exploration and exploitation rather than on direct techniques for detecting and discouraging suspicious activities.

See Antarctic Treaty (4) for account of officially proposed arms-control provisions.

* 42. Kissinger, Henry A. *Nuclear Weapons and Foreign Policy.* New York: Harper, 1957. 455 pages.

Chapter 7 emphasizes that levels of armaments reflect political assessments of the international state of affairs, and not vice versa. There are few opportunities for finding agreeable checks

on arms which will result in lessening tensions. The most promising form of check appears to be a more accurate flow of information concerning intentions.

43. Kistiakowsky, George B. "Science and Foreign Affairs," *Department of State Bulletin,* XLII, No. 1078 (22 February 1960), 276-283.

The Science Adviser to the President here discusses (p. 280) the relation between technical questions and politico-military questions.

Substantially the same statement appears in *BAS*, XVI, No. 4 (April 1960), 114-116, and *Science,* CXXXI, No. 3406 (8 April 1960), 1019-1024.

44. Madariaga, Salvador de. "Disarmament? The Problem Lies Deeper," *New York Times Magazine* (11 October 1959).

A statesman with extensive experience in disarmament negotiations under the League of Nations suggests that arms control cannot be made effective enough and will only increase the root cause of all armaments, which is the mistrust by each nation of the ultimate aims of other nations.

45. Meacham, Stewart. *Labor and the Cold War.* Philadelphia: American Friends Service Committee, 1959. 31 pages.

This pamphlet considers the relation of the defense industry to government arms policy and implies that policy is based on the contacts between persons who would strongly resist disarmament programs.

* 46. Melman, Seymour, ed. *Inspection for Disarmament.* New York: Columbia University Press, 1958. 291 pages.

This cooperative study is the first major published assessment of the technical requirements and limitations of effective inspection systems established for the purpose of detecting violations of agreements to limit production or testing of nuclear, chemical, and biological weapons or missile delivery systems. The technical feasibility of particular approaches ranging from long-distance monitoring of missile and bomb tests to direct "inspection by the people" is discussed in detail in 18 separate papers and in 3 reports of "evasion teams." The editor concludes that technically workable systems can be designed for both limited and comprehensive disarmament programs.

47. Moch, Jules. "Towards a Disarmed Peace," *International Journal,* XI, No. 2 (Spring 1956), 85-92.

A leading French negotiator of disarmament matters suggests that advances in technology are making real security impossible at any cost. The growing interest in controlled disarmament is hampered by distrust and the inability to see the other point of view as well as by specific technical and political problems involved in developing adequate controls. A progressive system commencing with simple verification procedures can circumvent the vicious circle of lack of confidence and lack of inspection. The most serious difficulty here recognized is the problem of bombs concealed before production can be controlled, for which

no technical solution has yet been advanced. Suggested bases for negotiation are (as of 1956): (i) no control alone without disarmament, (ii) no disarmament without control, and (iii) progressive disarmament covering that which can at present be controlled.

48. Murphy, Charles J. V. "Nuclear Inspection: A Near Miss," *Fortune*, LIX (March 1959), 122-125 and continued.

49. ——— "The Case for Resuming Nuclear Tests," *Fortune*, LX (April 1960), 148-150 and continued.

These two articles by C. J. V. Murphy stress the importance of fool-proof detection systems and of advancing our technology by further testing. The failure of Russian scientists to recognize the weaknesses in proposed systems is noted, and the reluctance to renew testing is ascribed to an unwillingness to present a firm policy in the face of the opinions of our allies and the public.

50. Murray, Thomas E. *Nuclear Policy for War and Peace.* Cleveland: World Publishing Co., 1960. 241 pages.

A member of the Atomic Energy Commission for seven years (1950-1957) describes in intimate detail the formulation of basic nuclear-policy decisions having to do with nuclear arms control.

Proposals are presented for developing small nuclear arms while also engaging in a measure of arms control and nuclear disarmament by dismantling stockpiles of high-yield bombs.

* 51. National Planning Association, Special Project Committee on Security through Arms Control. *1970 Without Arms Control.* Planning Pamphlet No. 104. Washington: National Planning Association, 1958. 72 pages.

This report describes the weapons systems which may be expected and to which control attempts would have to be addressed.

* 52. National Planning Association, and William C. Davidon, Christoph Hohenemser, and Marvin I. Kalkstein. *The Nth Country Problem and Arms Control.* Planning Pamphlet No. 108. Washington: National Planning Association, 1960. 41 pages.

This pamphlet contains a policy statement by the NPA Special Project Committee on Security through Arms Control, and a technical report of the Committee on the Technical Problems of Arms Control of the American Academy of Arts and Sciences, which concludes that 12 nations (including France) are able to embark on a successful nuclear-weapons program in the near future. On this basis the NPA Committee considers alternative policies for the nuclear powers and tends to favor maximum use of the IAEA as an instrument for control and development.

For a summary of the technical report see Howard Simons, *Dædalus,* LXXXVIII, No. 3 (Summer 1959), 385-409 (64).

53. Niebuhr, Reinhold. *The Structure of Nations and Empires.* New York: Scribner, 1959. 299 pages.

Niebuhr considers the prospects for abolishing weapons of mass destruction and for mitigating the animosities which promote conflict. He concludes that abolition is unlikely because an

over-all view in terms of total power relations, including military capacity and political prestige, suggests that the USSR is winning points in the uncommitted world under present conditions and that abolition of arms might place the United States in a still more unfavorable bargaining position. There is more likelihood that animosity will lessen as a result of the distribution of political power among different groups within the Soviet Union, and of increased education.

* 54. Noel-Baker, Philip. *The Arms Race: A Programme for World Disarmament.* London: Stevens and Sons, 1958. 579 pages.

This comprehensive book provides an extensive description and analysis of many relevant characteristics of modern armaments and of the official negotiations and proposals related to arms control and disarmament, including plans for limited and total nuclear disarmament. Considerable description of the pre-World War II designs for controlling conventional land, sea, and air arms is provided on the grounds that similar controls will have to be established, along with controls over research, development and production of such non-conventional weapons as missiles and nuclear, radiological, chemical, and biological weapons. Although the instability caused by modern arms and arms races is recognized, the requirements for maintaining international stability are not considered except in terms of disarmament. It is concluded that a program of comprehensive disarmament must be developed and agreed upon as the foreseeable objective of nations, while the exact details of successive stages are developed and implemented by degrees.

* 55. Nogee, Joseph. "The Diplomacy of Disarmament," *International Conciliation*, No. 526 (January 1960), 235-303. (Published by the Carnegie Endowment for International Peace as a separate pamphlet.)

Nogee places the disarmament negotiations in a broad context of changes in weapons technology and in public opinion, the comprehensiveness of disarmaments and controls, the shift from many-nation UN discussions to more direct great-power discussions, and the use of the negotiations themselves as a factor in international gamesmanship.

56. Nutting, Anthony. *Disarmament: An Outline of the Negotiations.* Issued under the auspices of the Royal Institute of International Affairs. London: Oxford University Press, 1959. 52 pages.

Nutting has participated in disarmament negotiations as a representative of the United Kingdom. Here he presents a clear outline which tends to emphasize the logical coherence and development of the negotiations as they have unfolded.

57. Orear, Jay. "How Feasible is a Test Ban?" *BAS*, XV, No. 3 (March 1959), 99-102.

An agreement to ban all nuclear-bomb tests is supported here on the grounds that, among other things, agreement on provisions for on-site inspection outweighs the risks in not limiting the ban to explosions which can be clearly detected remotely.

58. Osgood, Charles E. "A Case for Gradual Unilateral Disengagement," *BAS*, XVI, No. 4 (April 1960), 127-131.

A description of the thought processes which underlie arms races and of the feasibility of reducing tensions by graduated unilateral (but hopefully, reciprocated) disarmament while retaining nuclear deterrence.

59. Piel, Gerard. "The Economics of Disarmament," *BAS*, XVI, No. 4 (April 1960), 117-122, 126.

The publisher of *Scientific American* considers alternatives to military spending and suggests that the economic advantages of an arms race may have to be replaced by equally "wasteful" production if the political and psychological barriers against public works cannot be overcome.

Statements on this general subject by the economist Seymour Harris and others appear in the hearing of the Disarmament Subcommittee (9).

60. Rabinowitch, Eugene. "The Failure at Geneva," *BAS*, XVI, No. 2 (February 1960), 34-37.

The cofounder and editor of the *Bulletin of the Atomic Scientists* here reviews the Geneva negotiations on banning bomb tests and concludes that more harm than good may come from negotiations in the absence of sufficient trust to make success possible. Specific political controversies should first be settled and arrangements developed for constructive cooperation in the areas of science, technology, and economics.

61. Rosenfeld, Arthur H. "What About the Undetectable Tests?" *BAS*, XV, No. 3 (March 1959), 98, 103-108.

A lucid discussion of arguments for and against limiting a ban on bomb tests to those tests which are clearly detectable. It is pointed out that small nuclear bombs are by no means militarily insignificant.

62. Russell, Bertrand. *Common Sense and Nuclear Warfare.* New York: Simon and Schuster, 1959. 92 pages.

Abandonment of secrecy is advocated as proof of sincerity and a first step in the creation of mutual trust. Although disarmament is regarded as a palliative rather than a solution, a number of advantages to any agreed measure of disarmament are listed.

* 63. Schelling, Thomas C. *The Strategy of Conflict.* Cambridge: Harvard University Press, 1960. 309 pages.

This book is a clear and sophisticated demonstration of the insights to be gained from applying game-type reasoning to the analysis of serious social conflicts. Many useful parallels are drawn between international and interpersonal conflict situations and the means for resolving or lessening such conflicts. Of special relevance to the study of arms control is Chapter 10, "Surprise Attack and Disarmament," a longer version of which appears in *NATO and American Security*, pp. 176-208. Klaus Knorr, ed. Princeton: Princeton University Press, 1959.

It is suggested that not all inspection machineries and programs of arms limitation enhance stability. Limitations on weapons of massive retaliation may decrease stability by increasing the relative advantages of attacking first. In some situations an arms inspection machinery will enhance stability if it provides a means for conveying accurate information about peaceful intentions, even though it may not be adequate to convey information about clandestine activities. Emphasis is also placed on planning now for the kinds of arms-inspection machineries which may be needed if a crisis situation is to be solved peacefully or a limited war is to be kept within bounds.

64. Simons, Howard. "World-Wide Capabilities for Production and Control of Nuclear Weapons," *Dædalus*, LXXXVIII, No. 3 (Summer 1959), 385-409.

This article summarizes a report prepared for the Committee on the Technical Problems of Arms Control of the American Academy of Arts and Sciences by Davidon, Hohenemser, and Kalkstein (52). The report, based on unclassified information, is a technical estimate of capabilities for producing homemade atomic bombs and for devising techniques to reveal or control clandestine production of nuclear weapons. Twelve nations were found to be technically able to embark on a nuclear-weapons program; eight others were capable except for limited scientific manpower; and six more which are probably economically capable were found to have industrial capacities which made unlikely a successful program within the next four years.

Some of the political implications of the spread of nuclear weapons are reviewed. After considering the likely consequences, it is concluded that the disadvantages exceed the benefits to good international relations which will result if an increased number of nations possess at least some bombs. It is emphasized that control of the spread of nuclear-weapons capabilities is possible.

The Committee is continuing its program of research into the technical problems of arms control.

* 65. Singer, J. David. "Threat-Perception and the Armament-Tension Dilemma," *Journal of Conflict Resolution*, II, No. 1 (March 1958), 90-105.

This article explores the ways in which political tensions and armaments races have interacted. It suggests that a dilemma can be overcome by the gradual building up of a responsible international force.

66. Stevenson, Adlai E., *et al.* "The Nuclear Test Ban," *BAS*, XVI, No. 3 (March 1960), 85-92.

Included here are statements by Stevenson, Senators Hubert H. Humphrey, Clinton Anderson, and Frank Church, and by Harold Brown, Deputy Director of Lawrence Radiation Laboratory, University of California, Livermore, California.

67. Stoessinger, John G. "Atoms for Peace: The IAEA," in *Organizing Peace in the Nuclear Age*, pp. 117-233. A report of the Commission to Study the Organization of Peace (Arthur N. Holcombe,

chairman), with supplementary papers. New York: New York University Press, 1959.

Section 8 of Part II discusses safeguards, inspections and sanctions. It emphasizes the difficulties and limitations of the proposed system so long as the nuclear powers not only do not employ it but also make bilateral agreements which permit other nations to develop their nuclear-energy facilities without going to the IAEA for assistance.

68. Szilard, Leo. "How to Live with the Bomb and Survive," *BAS*, XVI, No. 2 (February 1960), 58-73.

Szilard was one of the instigators of United States efforts to produce an atomic bomb, and ever since then he has been concerned with the bomb's effect on international affairs. Here he outlines what he calls a "metastable" situation in which nations possessing long-range missiles with bombs are held strictly accountable with threats and transgressions computed, using the destruction of cities (according to an announced schedule) as the currency of exchange.

He suggests that the United States, the Soviet Union, and other nations participating in this system might have a great mutual interest in arms control with inspection for other nations and even for some of their own arms. The notion that what is good for one side must be bad for the other will, Szilard suggests, become less and less relevant. The implications of this theory for bomb-test suspension agreements are explored by Szilard in "To Stop or Not To Stop," *BAS*, XVI, No. 3 (March 1960), 82-84, 108.

69. Topchiev, A. V. "Disarmament and International Tension," *BAS*, XIV, No. 10 (December 1958), 405-408.

A leading Soviet scientist discusses opportunities for reducing tensions and increasing international confidence by means of safeguards against bomb testing, surprise attack and other military threats. It is suggested that control without mutual trust is not so much control as reconnaissance or probing for the weak spots of "the eventual enemy."

70. Toynbee, Philip, ed. *Fearful Choice: A Debate on Nuclear Policy.* Detroit: Wayne State University Press, 1959. 112 pages.

A number of British writers here debate the suggestion that the unilateral withdrawal of Europe from the arms race and virtual capitulation to the USSR would not result in Soviet occupation or abuse and would reduce the danger of annihilation.

* 71. Washington Center of Foreign Policy Research, The Johns Hopkins University. *Developments in Military Technology and Their Impact on U.S. Strategy and Foreign Policy.* (Prepared for the Committee on Foreign Relations of the United States Senate as United States Foreign Policy Study No. 8.) 1959. 120 pages.

This study suggests that the pace of technological advances makes it unlikely that perfect strategic military stability will ever be attainable. The deterrent strength of the United States is diminishing. Both arms control and strategic nuclear stability,

by means of second strike capability, are discussed as means of attaining a measure of international stability. Although consideration of possible limited aggression, "Nth nation" problems, and likely technological advances encourage efforts at arms control, it is suggested that total disarmament would produce less stability than a system of arms control which (i) permitted second strike capability, (ii) encouraged research on how to maintain stability in the light of technological developments, (iii) provided some possibility of sanctions by an international police force, and (iv) established an inspection system capable of proving accusations false when this is so. It is also pointed out that an inspection system is more efficient if it checks the accuracy of data provided by the inspected than if it endeavors to assemble all data independently.

72. Wohlstetter, Albert. "The Delicate Balance of Terror," *Foreign Affairs*, XXXVII, No. 2 (January 1959), 211-234.

A clear statement of how the US strategy of deterrence depends on the ability to strike back in spite of having been attacked in a general war. This ability is by no means assured. It is suggested that arms-control measures involving some kinds of inspection or arms limitations might reduce the danger of surprise attack and thereby improve our capacity to deter. It is pointed out that relaxing tensions is not an end in itself, and disarmament in lieu of the over-all balance of terror would magnify the advantages accruing from the successful concealment of a few weapons, and hence place impossible demands on any arms-control mechanism.

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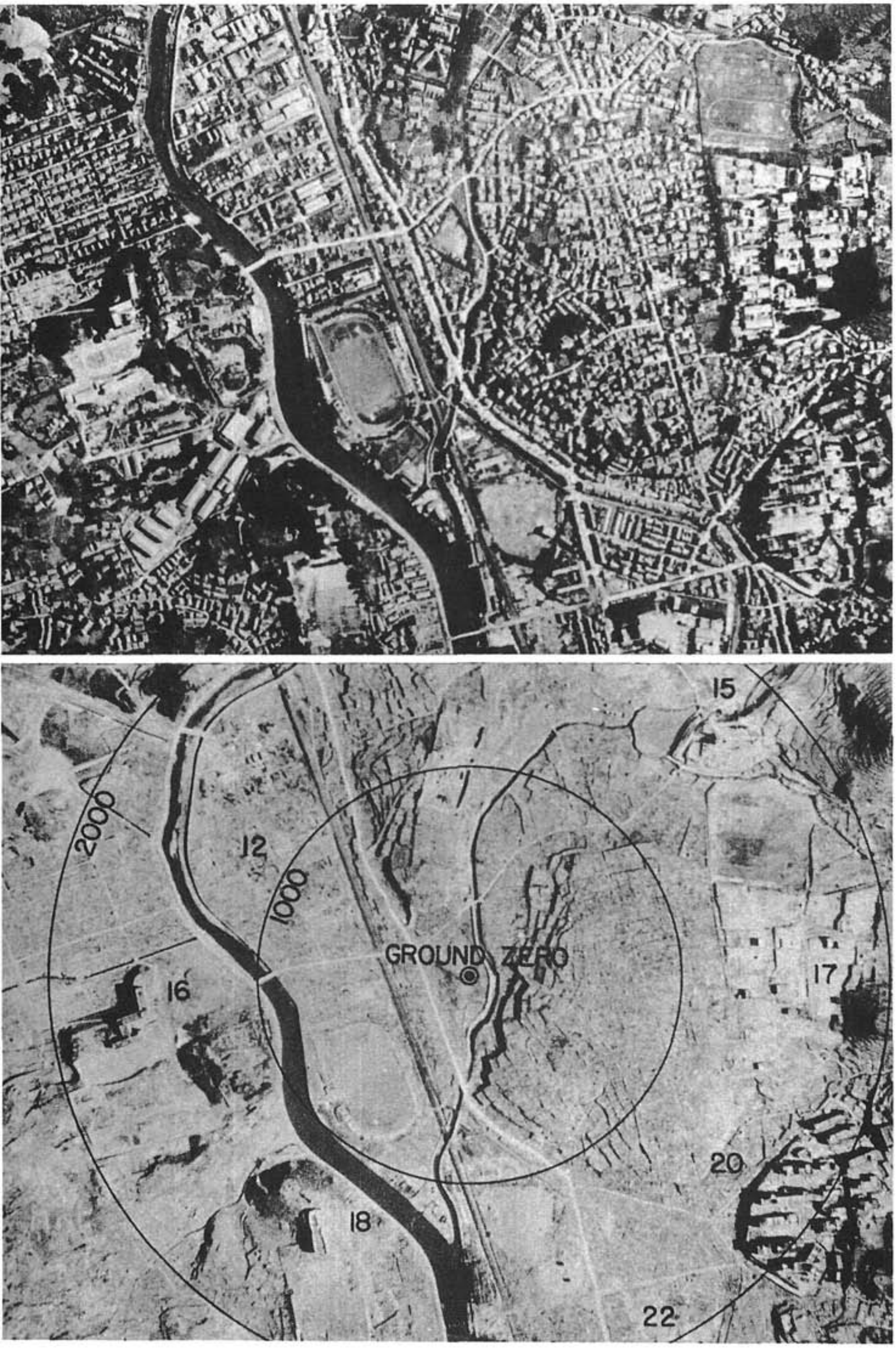
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GURE 1. Area around ground zero at Nagasaki before and after the atomic explosion. hese photographs are reproduced by courtesy of the United States Atomic Energy mmission.)